

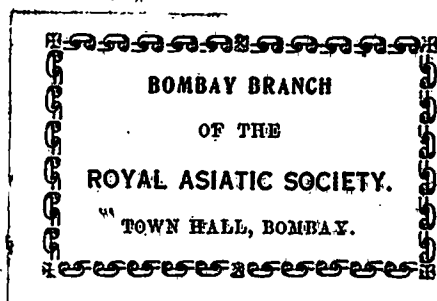
*Annual Report of the
Public Health Commissioners
with the Government of India*

1937



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ANNUAL REPORT
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Volumes I. & II
With Appendices



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FOR 1937



Volume I

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ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937.

VOLUME I.

TABLE OF CONTENTS.

SECTION I.

ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1937.

PAGE.	PAGE
1. Introduction	1
2. Population	3
3. Live-births	6
4. Deaths	9
5. Infantile mortality	11
6. Still-births	16
7. Registration and compilation of vital statistics	17
8. Vital statistics of some Indian States	21
9. Rainfall	23
10. Agricultural and economic conditions	25
11. Famine relief	26

SECTION II.

HISTORY OF THE CHIEF DISEASES.

12. Introduction	28
13. Cholera	29
14. Plague	35
15. Smallpox	40
16. Fevers	44
17. Malaria	44
18. Dysentery and diarrhoea	51
19. Enteric fever	52
20. Respiratory diseases	53
21. Pneumonia	54
22. Tuberculosis	55
23. Epidemic dropsy	58
24. Hookworm infection	59

SECTION II—*contd.*HISTORY OF THE CHIEF DISEASES—*contd.*

PARA.	PAGE.
25. Leprosy	60
26. Yaws	63
27. Kala-Azar	65
28. Relapsing fever	68
29. Influenza	69
30. Goitre	69
31. Dracontiasis	70
32. Diphtheria	71
33. Typhus	72
34. Cerebrospinal meningitis	72
35. Trachoma	73

SECTION III.

MATERNITY AND CHILD WELFARE.

36. Introduction	75
37. Maternal mortality	76
38. Existing maternity services	82
39. Infant and child welfare	83

SECTION IV.

PUBLIC HEALTH ADMINISTRATION.

40. Introduction	87
41. Rural health	90
42. School medical inspection	94
43. Fairs and festivals	99
44. Health propaganda	102
45. Adulteration of food	105
46. Housing	108
47. Industrial hygiene	110
(i) Factories	110
(ii) Mines	112
48. Railways	114

SECTION V.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH INCLUDING PORTS.

PARA.	PAGE.
49. Introduction	120
50. Office International d'Hygiene Publique, Paris	121
51. Singapore Bureau, League of Nations, Health Organisation	125
52. League of Nations Health Organisation, Geneva	127
53. Intergovernmental conference of Far-eastern countries on Rural Hygiene	129
54. The Indian Delegation to the 18th (Ordinary) Session of the Assembly of the League of Nations	135
55. Port Quarantine	139
56. Port of Bombay	141
57. Port of Karachi	143
58. Airport of Karachi	144
59. Port of Calcutta	145
60. Port of Madras	146
61. Port of Chittagong	147
62. Port of Cochin	147
63. Port of Vizagapatam	147
64. Kamarin Quarantine Station, Red Sea	148

SECTION VI.

VACCINATION AGAINST SMALLPOX.

65. General	149
66. Vaccination and revaccination statistics	149
67. Compulsory vaccination	153
68. Vaccine Institutes and supply of vaccine	154
69. Indian States	159

SECTION VII.

PUBLIC HEALTH WORKS.

70. General	160
71. North-West Frontier Province	165
72. Punjab	165
73. Delhi	167
74. United Provinces	168
75. Bihar	170
76. Orissa	170
77. Bengal Presidency	171
78. Central Provinces	171
79. Bombay Presidency	171
80. Sind	172
81. Madras Presidency	173
82. Assam	173

SECTION VIII.

LABORATORIES AND MEDICAL RESEARCH.

PARA.	PAGE.
83. Central Research Institute, Kasauli	174
84. All-India Institute of Hygiene and Public Health, Calcutta	176
85. Central Drugs Control Laboratory	178
86. School of Tropical Medicine, Calcutta	179
87. Haffkine Institute, Bombay	181
88. King Institute of Preventive Medicine, Madras	182
89. King Edward VII Memorial Pasteur Institute, Shillong	183

INDIAN RESEARCH FUND ASSOCIATION.

90. General	185
91. Cholera	185
92. Malaria	185
93. Nutrition	186
94. Leprosy and Plague	187
95. Vaccines	187
96. Tuberculosis	187
97. Indigenous drugs	187
98. Maternal mortality	188
99. Miscellaneous	189
100. Research work in Medical Colleges	193
101. Pasteur Institutes and antirabic treatment	194

SECTION IX.

HEALTH OF JAILS IN INDIA.

102. General	200
103. Jails of all classes	200
104. District and central jails	203
105. Borstal and juvenile institutions	208
106. Andamans	211
107. Conclusion	213

SECTION X.

VOLUNTARY ORGANISATIONS.

PARA.	PAGE.
108. Introduction	215
109. Indian Red Cross Society	215
110. British Empire Leprosy Relief Association (Indian Council)	218
111. The Mission to Lepers	219
112. The International Health Division of the Rockefeller Foundation	219
113. The Bombay Presidency Baby and Health Week Association	220
114. Karachi Health Association	221
115. Health Propaganda Board, Madras	221

SECTION XI.

MISCELLANEOUS.

116. Prevention of blindness	222
117. Yellow fever	225

FORTY YEARS PROGRESS IN PUBLIC HEALTH.

118. Introduction	229
119. Public Health organisations	230
120. The Central Advisory Board of Health	230
121. The All-India Institute of Hygiene and Public Health, Calcutta	231
122. Rural health	231
123. Health improvements in Delhi and New Delhi	232
124. International health work and port health administration	233
125. Medical research	235
126. Nutrition	236
127. Malaria	238
128. Maternity and child welfare work	239
129. Anti-tuberculosis work	240
130. Leprosy	241
131. Venereal diseases	243
132. Publicity	244
133. Conclusion	246

Appendices I —VIII (see details on page 249 *et seq.*).

LIST OF ILLUSTRATIONS.

MAPS.

1. Key Map of India showing provinces and districts. (*Facing page 1*).
2. Map No. 1 showing the distribution of cholera mortality in India during 1937. (*Facing page 30*).
3. Map No. 2 showing world plague situation in 1937-38. (*Facing page 35*).
4. Map No. 3 showing the distribution of plague mortality in India during 1937. (*Facing page 35*).
5. Map No. 4 showing the distribution of smallpox mortality in India during 1937. (*Facing page 42*).
6. Map No. 5 showing the approximate distribution of hookworm infection in India. (*Facing page 59*).
7. Map No. 6 showing the distribution of guineaworm infection in India. (*Facing page 70*).

CHARTS, GRAPHS, ETC.

1. Chart No. 1 showing a comparison of birth, death and infantile mortality rates of British India with other countries in 1937. (*Facing page 2*).
2. Chart No. 2 showing infantile mortality *per mille* of live-births in British India during 1937. (*Facing page 12*).
3. Graph No. 3 showing infantile mortality rates *per mille* of live-births in British India and provinces during the years 1892-1937. (*Facing page 11*).
4. Chart showing comparative diagrams of deaths by causes in British India during 1937 and the decennial mean 1928-37. (*Facing page 29*).
5. Graph No. 5 showing cholera deaths by months in British India, excluding Burma, during 1933-37. (*Facing page 31*).
6. Chart No. 6 showing monthly plague mortality rates per 100,000 of estimated population in British India, excluding Burma, during 1924-37. (*Facing page 37*).
7. Graph No. 7 showing smallpox deaths by months in British India, excluding Burma, during 1933-37. (*Facing page 40*).
8. Chart No. 8 showing vaccination percentages of successful cases to total operations during 1937-38 and revaccination successes. (*Facing page 150*).

KEY MAP OF INDIA (SHOWING PROVINCES AND DISTRICTS).

REFERENCE.

Boundaries of administrative divisions, international boundaries, etc.
 1. Principal cities, towns, etc.
 2. District boundaries, etc.

REFERENCE.

- PROVINCES AND DISTRICTS.**
- 1. Baluchistan
 - 2. Punjab
 - 3. Sind
 - 4. Rajputana
 - 5. Kathiawar
 - 6. Gujarat
 - 7. Bombay
 - 8. Madras
 - 9. Mysore
 - 10. Cochin
 - 11. Travancore
 - 12. Ceylon
 - 13. Andaman Islands
 - 14. Lakshadweep
 - 15. Pondicherry
 - 16. Karaikal
 - 17. Daman
 - 18. Diu
 - 19. Goa
 - 20. Portuguese India
 - 21. French India
 - 22. Dutch India
 - 23. Portuguese Timor
 - 24. Dutch Timor
 - 25. Siam
 - 26. Laos
 - 27. Cambodia
 - 28. Annam
 - 29. Tonkin
 - 30. China
 - 31. Japan
 - 32. Korea
 - 33. Manchuria
 - 34. Mongolia
 - 35. Tibet
 - 36. Nepal
 - 37. Bhutan
 - 38. Sikkim
 - 39. Assam
 - 40. Bengal
 - 41. Orissa
 - 42. Madhya Pradesh
 - 43. Uttar Pradesh
 - 44. Bihar
 - 45. Assam
 - 46. Bengal
 - 47. Orissa
 - 48. Madhya Pradesh
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 - 50. Bihar
 - 51. Assam
 - 52. Bengal
 - 53. Orissa
 - 54. Madhya Pradesh
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 - 62. Bihar
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 - 64. Bengal
 - 65. Orissa
 - 66. Madhya Pradesh
 - 67. Uttar Pradesh
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 - 69. Assam
 - 70. Bengal
 - 71. Orissa
 - 72. Madhya Pradesh
 - 73. Uttar Pradesh
 - 74. Bihar
 - 75. Assam
 - 76. Bengal
 - 77. Orissa
 - 78. Madhya Pradesh
 - 79. Uttar Pradesh
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 - 82. Bengal
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 - 27. Orissa
 - 28. Madhya Pradesh
 - 29. Uttar Pradesh

Annual Report of the Public Health Commissioner with the Government of India for 1937.

(11)

VOLUME I.

SECTION I.

ON THE STATE OF THE PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1937.

Introduction.

1. The principal vital statistics of British India for 1937 are given below, the figures for 1936 being shown along-side for comparison. On 1st April 1937, Burma was separated from India and the figures for both years are therefore exclusive of Burma. All figures in this report, unless otherwise stated, exclude Burma.

	1937.	1936.
Mid-year estimated population	272,406,436	269,058,609
Density per square mile	358	354
Births { Number	9,388,457	9,566,379
{ Rate per mille	34·5	35·6
Deaths { Number	6,112,375	6,111,358
{ Rate per mille	22·4	22·7
Infantile death rate per 1,000 live-births	161·7	161·0
Vital Index	153·6	156·5

Both the birth and death rates show slight decreases as compared with the previous year, but the net result was an increase in the estimated mid-year population of over three and a quarter millions. The average annual increase in population during the seven years from 1931 to 1937 has been just short of three millions and these years have, generally speaking, been characterised throughout by freedom from violent out-breaks of epidemic diseases.

During 1937, whilst plague mortality was appreciably higher than in 1936, deaths due to cholera and smallpox showed large decreases, so that there was a total reduction of over 90,000 deaths from these common epidemic diseases. Deaths from cholera numbered 99,054, or about 38 per cent. less than those for 1936. Smallpox accounted for 54,810 deaths, which represented a decrease of about 47 per cent. On the other hand, plague mortality rose from 10,738 in 1936 to 28,169 in 1937. Once more it may be noted that the combined effect of these three diseases in the death rate was relatively small; for the period 1925—1937 they comprised less than 10 per cent. of the total recorded mortality. It is the fevers, respiratory diseases, and "other causes" groups under which the great majority of deaths are registered.

Abbreviations:—

N.-W. F. P.—North-West Frontier Province.

C. P.—Central Provinces.

U. P.—United Provinces.

In respect of general health conditions, as judged by the total death rate and those for specific diseases and for infantile mortality, India compares unfavourably with many countries of the world. Even in this country, however, improvement is noticeable when the experience of a period of years is taken into consideration. The general death rate has shown a steady decline between 1920 and 1937, the rates for these years being 31 *per mille* and 22 *per mille* respectively. Similarly, the infantile mortality rate has fallen from 195 *per mille* to 162 *per mille*. But these figures give little room for complacency, India's death rate of 22·4 *per mille* is still nearly twice that of England and Wales, whilst the infantile mortality figures are almost three times as high.

It is pleasing to note, however, that recent years have undoubtedly witnessed an increasing awareness, on the part of both Provincial Governments and the educated public, of the magnitude of the problems associated with the building of national health on sure foundations. Advance has been made, for instance, in the provision of public health staffs in the provinces, in the better control of festival centres and in the free distribution of quinine to malaria-stricken populations, whilst the efforts of individuals, of voluntary organisations and of public health staffs in educating public opinion in different ways, have been a commendable feature in different parts of the country.

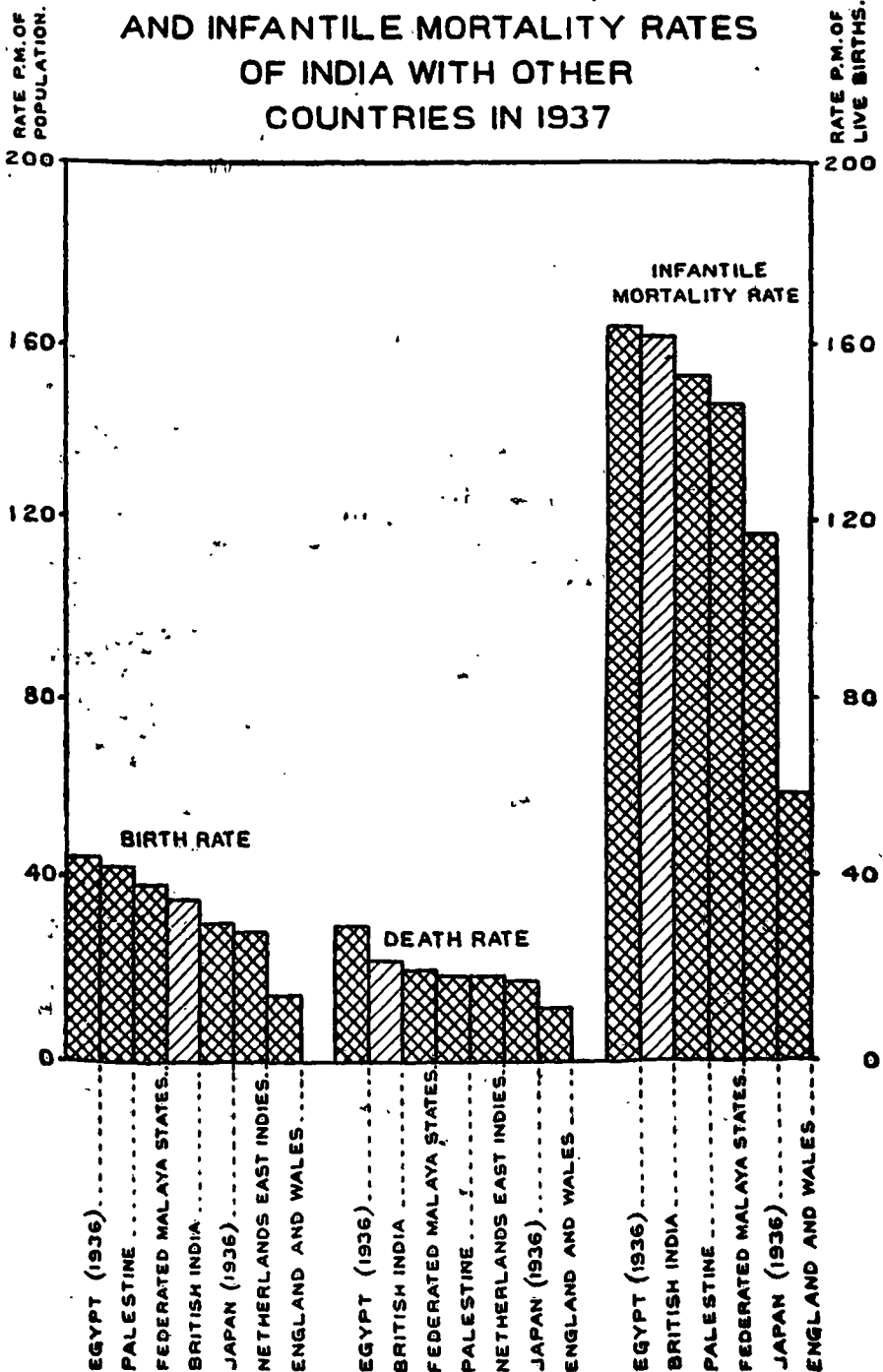
Further, a number of intensive experiments in restricted areas are in progress, the object of these "Health Units", as they are called, being to evolve types of public health organisation suited to rural populations. In a wider sphere, also, a measure of co-ordination between the provinces of British India and Indian States has been secured by the inauguration of the Central Advisory Board of Health on which the Government of India, the Provinces and States are all represented.

Repeated stress has been laid in these reports on the fact that public health cannot be regarded as an entity distinct from the general, social and economic life of the community. It is, therefore, satisfactory that the advent of provincial autonomy and the conferment of extensive powers on Provincial Governments have been followed in many provinces by social legislation which will undoubtedly have far-reaching effects on the economic life and general well-being of the people. Agricultural indebtedness, land tenure and industrial problems, to cite a few examples, are all receiving serious attention and, in so far as legislative and administrative action in these directions goes to raise the standard of life, these measures will inevitably help in improving the state of public health. In these annual reviews of the health conditions of India, there is little room for any detailed survey of social and economic factors, but mention is made of these wider aspects of community life in order to emphasise the necessity of viewing health problems from the widest possible angle.

In order that there may be no undue feeling of pessimism, it should always be remembered that, less than a century ago, conditions in Great Britain were not much different from those found in India today and that, with respect to other countries, reduction of the general death rate below that at present recorded in India dates back to only a few years. There seems no reason why India should not accomplish what has been achieved in other parts of the world, if only organised effort is continued and if public support is given to that effort.

In the chart facing this page and in Table I (i) are set out the birth and death rates per 1,000 of the population and the infantile death rates per 1,000 births for British India during 1937. The corresponding rates of a number of other countries are included for purposes of comparison.

A COMPARISON OF BIRTH, DEATH- AND INFANTILE MORTALITY RATES OF INDIA WITH OTHER COUNTRIES IN 1937



NOTE: Infantile mortality rate for Netherlands East Indies is not available.

TABLE I (i).
1937.

	Birth rate per 1,000 population.	Death rate per 1,000 population.	Infant mortality per 1,000 live-births.	Maternal mortality per 1,000 live- births.
British India	34.5	22.4	162	20.0*
England and Wales (†)	14.9	12.4	58	3.2
Federated Malay States	37.8	19.9	147	9.0
Japan (For 1936)	29.9	17.5	117	2.6
Palestine	41.6	18.9	153	..
Egypt (For 1936)	44.2	28.9	164	†4.7
Netherlands East Indies	28.3	18.8	..	..

In some of these other countries, the figures do not relate to the whole population, but taking the figures as they stand, the birth rate in India has been exceeded by three others in the table. As regards death rate, India is second only to Egypt. The differences between birth and death rates give some measure of the natural increase in each country and in this respect the variations are striking, ranging as they do from 2.5 *per mille* in England and Wales to 22.7 *per mille* in Palestine. India stands midway between these extremes, the natural increase for 1937 being 12.1 *per mille*. With regard to infantile mortality, Egypt and India record very similar rates, although others also except England and Wales, show comparably high rates.

Population.

2. Table I (ii) gives the mid-year estimated population of British India and of the individual provinces, with additional columns showing percentage increases or decreases for 1937 and for the period from the 1931 census to the middle of 1937. Table I (iii) gives the age and sex distributions of these estimated mid-year populations. In making these calculations, it has been assumed that the age and sex distributions of the populations of British India and of the provinces at the 1931 census were applicable to the 1937 figures.

TABLE I (ii).

	Estimated population on 30th June 1936.	Estimated population on 30th June 1937.	Percentage increase or decrease.	Total percent- age increase from 1st March 1931 to end of June 1937.
British India	269,058,609	272,406,436	1.24	7.42
N.-W. F. P.	2,492,842	2,523,589	1.23	6.99
Punjab	25,556,656	26,069,627	2.01	11.12
Delhi	685,792	699,157	1.95	9.89
U. P.	51,673,414	52,390,009	1.39	8.22
Bengal	51,674,916	52,195,805	1.01	4.60
Bombay	19,149,124	19,383,756	1.23 }	8.31
Sind	4,204,713	4,237,554	0.78 }	
Bihar	34,293,254	34,695,892	1.17 }	7.47
Orissa	7,159,596	7,209,846	0.70 }	
C. P.	16,518,144	16,604,896	0.53 }	
Madras	46,543,720	47,201,665	1.41 }	
Coorg	164,700	164,619	-0.05	0.79
Assam	8,356,513	8,438,246	0.98	6.44
Ajmer-Merwara	585,225	591,775	1.12	5.62

* This may be taken as an approximate estimate of the rate for India as a whole in the light of the findings of a few inquiries in limited areas.

† Localities having a Health Bureau only.

TABLE I (iii).

	Males.	Females.	Total.
All ages	140,319,590	132,086,846	272,406,436
0—5 years	20,142,654	20,451,387	40,594,041
5—10 „	18,438,979	16,650,705	35,089,684
10—15 „	16,922,260	14,795,406	31,717,666
15—20 „	12,781,703	12,663,480	25,445,183
20—30 „	24,353,698	24,268,885	48,622,583
30—40 „	20,091,502	17,978,714	38,070,216
40—50 „	13,837,770	12,106,513	25,944,283
50—60 „	8,235,178	7,645,002	15,880,180
60 years and upwards	5,515,846	5,526,754	11,042,600

Since the census of 1931, the annual rate of increase has ranged between 0·9 and 1·4 per cent. and, for the period of six years and four months since the census, the total increase has been 7·4 per cent. As was pointed out in last year's report, these annual estimates, based on the difference between registered births and deaths, are bound to be in defect of the actual figures, in view of the fact that birth registration is less accurate than that of deaths and that the 1931 census disclosed appreciably larger figures for the enumerated populations than the estimates made from recorded vital statistics. It is, therefore, clear that no slackening of the rate of growth of population has yet occurred.

In successive reports attention has been drawn to the urgency and importance of the population problem and, as this question has such an important bearing on all others relating to national reconstruction and to public health in particular, no apology need be made for returning to the subject. No useful purpose is ever served by shutting one's eyes to indisputable facts. The subject is no academic one ; it is, for instance, not merely a matter of the verification or otherwise in this country of the Malthusian doctrine of population out-stripping the food supply in the presence of unrestricted multiplication of numbers. Available data may be insufficient for the drawing of definite conclusions, but it seems to be too optimistic to assume that the population problem is neither pressing nor deserving of serious study because of possible extensions of improved agricultural practice and the possible application of new scientific discoveries. The continuing low standard of life and the rapid expansion of numbers that have characterised the present and preceding decennia are facts which must be faced. Into this complex situation another important factor has been recently introduced in the form of a preventive health campaign which, in spite of serious deficiencies, has already been able to save increasing numbers of human lives. No civilized government can turn back on an expanding programme of health endeavour, so that it is all the more essential for thoughtful men and women to turn their attention to the study of this problem. As Sir John Megaw has recently pointed out, what is required is

“ education of the whole community in life planning. The people must be made to realise what they are up against, and how they can control the forces of nature to their own advantage. We have plenty of examples of what can be done by education of the masses ; in Russia, Italy and Germany the entire psychology of the people has been changed by insistent propaganda. There is no reason why propaganda should not be employed in a good cause like the uplift of the people. Let me dispel at once the idea that the people of India resent discussion of the biological aspects of the problem. I have discussed the matter with many Indians and never once have I found anything but the greatest willingness to engage in a frank discussion of the various implications of the subject ; always, too, there has been a clear appreciation of the extreme importance of the problem. There must be no illusions as to the difficulty of applying the remedy to which I have referred ; it may sound very simple to invoke the blessed word “ education ”, in

reality the best brains of India helped by the best brains of the outside world will be needed. Experts in agriculture, education, public health, economics and industry must co-operate in deciding what should be taught; then the subject matter must be prepared in a form which will be palatable to the masses. We must find people who know how to tickle the ears of the audiences and the eyes of readers. The press, the cinema, the wireless stations, the schools, pamphlets, posters and all the resources of the expert advertiser must be brought into play. But before anything can be done, the educated community must be made to realise that it is a matter of life and death, that early action should be taken, and I can think of no better way to bring this truth forcibly to the notice of the public than to set up a committee of enquiry."

In view of India's vast territory and the varying nature of the problems which the population question presents in different parts of the country, it seems desirable to have more than one committee for population studies. One of the main functions of such committees would be to arouse public opinion. Apart from this the committees can and should consider the possibility of coordinating, as far as possible, all agricultural, economic and social investigations now in progress. Recent years have witnessed increasing interest in respect of such matters as improved agricultural practice, marketing, nutrition, animal husbandry, irrigation and forestry research and the coordination of these studies in relation to national planning for improvement of the general standard of life is one of greater importance than is generally realised. As has been pointed out in a recent report of the Economic Committee to the Council of the League of Nations*, "intensity of economic life" is the determining factor for the prosperity of a nation in that it confers on the country a "real economic territory" more extensive than the territory bounded by its political frontiers.

"A state whose national territory is small, like Switzerland, but which, owing to intensive relations with foreign countries (trade, finance, tourist traffic, etc.), can obtain all it requires for the extensive needs of its population, levies a sort of tribute on foreign territories, which supply it with cotton, grain, fruit and many other things and, even on their subsoil, from which it obtains metals and other mineral products. Switzerland's "real economic territory" may thus be said greatly to exceed her geographical territory. The latter offers no explanation of how Switzerland comes to have a population of approximately four million inhabitants with a high standard of living, though her territory, if considered merely by reference to the 'man-land' ratio, would have difficulty in supporting a quarter of that population."

In India the low standard of living and the steadily growing population constitute a disquieting combination, but the resources of the country are immense and there is no need for despair so long as the different governments are determined so to organise the material and human resources at their disposal as to produce the maximum benefit to the community. Most of the questions relating to the health and economic welfare of the people are statutorily the functions of provincial Governments and it is their responsibility to set up the machinery necessary for the study of demographic problems within their areas of jurisdiction. In addition to official agencies, universities and research institutions should be induced to assist and the work could perhaps be suitably coordinated by the formation of a committee in each province to plan the necessary investigations and to place its expert knowledge at the disposal of the Governments so that a sound economic and social policy might be reached. Such a committee could also perform the extremely useful function of educating public opinion on correct lines.

* (C. 233 M. 132. 1938 II B, dated 11th July, 1938.)

Live-births.

3. The number of births in British India, exclusive of Burma, was 9,388,457 in 1937 or approximately 178,000 less than those for the same area in 1936. Decreases were recorded in most of the provinces, Delhi, Bengal, Assam, Madras and Coorg being the exceptions. Minor fluctuations of this kind from one year to another seem to be of little significance. The crude birth rate was 34·5 *per mille* in 1937 as against 35·6 in 1936. Table I (iv) gives the number of registered male and female births and rates *per mille* based on the estimated populations of British India and of the different provinces. The last column gives the numbers of males born per 100 females.

TABLE I (iv).

	Births.			Rate per mille		No. of males born per 100 females in 1937.
	M.	F.	Total.	1937	1936	
British India	4,880,571	4,507,886	9,388,457	34·5	35·6	108
N.-W. F. P.	40,950	31,577	72,527	29	31	130
Punjab	573,977	516,750	1,090,727	42	43	111
Delhi	16,368	14,775	31,143	45	45	111
U. P.	922,184	816,722	1,738,906	33	37	113
Bihar	564,243	536,414	1,100,657	32	33	105
Orissa	124,129	117,617	241,746	34	36	106
Bengal	886,461	820,589	1,707,050	33	32	108
C. P.	320,231	302,708	622,939	38	39	106
Bombay	376,426	353,050	729,476	38	39	107
Sind	43,098	34,291	77,389	18	19	126
Madras	870,240	831,422	1,701,662	36	36	105
Coorg	2,068	1,960	4,028	24	24	106
Assam	128,233	119,991	248,224	29	29	107
Ajmer-Merwara . . .	11,963	10,020	21,983	37	40	119
	M-Male.		F-Female.			

The proportion of male to female births in different provinces shows a range of variation from 105 in Madras Presidency and Bihar to 130 in the N.-W. F. Province. A comparison of these figures from 1924 onwards shows that, for each province, the sex ratio at birth maintains a remarkable degree of consistency. It is doubtful if the wide variations found in India in contrast with other countries can be explained in terms of racial difference alone; it is fairly clear that omission to register female births is much more common than in the case of males.

The recorded birth rates show considerable variation, from 18 *per mille* in Sind to 42 *per mille* in the Punjab and 45 *per mille* in Delhi. The low figure for Sind is undoubtedly due to defective registration, whilst the rates for the Punjab and Delhi are probably close approximations to actual rates.

An examination of urban birth rates shows that many births still remain unrecorded even in towns with large populations and in district headquarter municipalities. For instance, in Bihar, Arrah with a 1931 census population of 48,922 recorded in 1937 a birth rate of 10·1 *per mille*, Katihar with a population of 15,864 a rate of 3·9 *per mille* and Jamshedpur with a population of 83,738 a rate of 3·5 *per mille*. In Jamshedpur, the female population numbered 32,601 according to the 1931 census and, in view of its industrial nature, it may be assumed that an appreciable proportion of the female population falls within the reproductive age periods. Some investigation of these figures would seem to be necessary, especially as during 1936, a similarly low rate (5·3 *per mille*) was recorded. Other examples are Cuttack in Orissa with a population of 65,263 and a recorded birth rate of 12·7 *per mille* and in Bengal, the district headquarter

municipalities of Bankura, Khulna, Dinajpur, Pabna and Comilla with recorded rates of 9·9, 8·9, 9·8, 10·0 and 8·6 *per mille*. Similar figures could be quoted from other provinces, but it is hoped that the necessity for stricter supervision of registration work by public health staffs has been sufficiently emphasised. Every area with a population of ten or twelve thousand certainly requires investigation if the birth rate falls below 20·25 *per mille*.

Rural and urban birth rates for British India and the provinces during 1937 are given in table C, Appendix I. For British India as a whole these were very similar, the rural rate being 34·4 *per mille* and urban 35·0 *per mille*. The urban rate ordinarily exceeded the rural rate, exceptions to this rule being met with in the provinces of the Punjab, Delhi, Bihar, Orissa, Bengal and Bombay. The difference between the two rates varied widely from province to province, *e.g.*, from 1·8 *per mille* in N.-W. F. P. to 34·7 *per mille* in Coorg. In respect of the latter, the large difference is almost certainly due to serious defects in the registration of births in rural areas.

Crude birth rates do not of course give even an approximate measure of the fertility of women. The fertility rate varies at different age periods during a woman's reproductive life and a true measure of fertility can be obtained only by calculating the number of legitimate children born during a particular year to women at specific ages as ratios of the married women at those ages. Although the necessary figures are not available in this country, an attempt has been made to give approximate estimates of fertility during the period, 15·40 years, which covers much the largest portion of a woman's reproductive life. The figures are shown in the last column of Table I (v). It has been assumed that the proportions of married women at the 1931 Census held good for 1937.

TABLE I (v).

	Female population 15-40 years.	Total births.	Rate <i>per mille</i> based on total female population, 15-40 years.	Rate <i>per mille</i> based on married female population 15-40 years.
England and Wales (1936)				112·2
British India	54,911,079	9,388,457	171·0	203·8
N.-W. F. P.	481,176	72,527	150·7	187·2
Punjab	4,620,435	1,090,727	236·1	280·5
Delhi	131,519	31,143	236·8	268·6
U. P.	10,278,375	1,738,906	169·2	193·3
Bihar	7,057,278	1,100,657	156·0	181·6
Orissa	1,657,309	241,746	145·9	
Bengal	10,818,531	1,707,050	157·8	191·2
C. P.	3,401,247	622,939	183·2	206·7
Bombay	3,899,433	729,476	187·1	202·4
Sind	805,460	77,389	96·1	
Madras	9,979,823	1,701,662	170·5	215·3
Coorg	33,423	4,028	120·5	166·1
Assam	1,632,381	248,224	152·1	187·4
Ajmer-Merwara	114,689	21,983	191·7	217·0

Punjab leads with a fertility rate of 280·5 *per mille* and is closely followed by Delhi province with 268·6 *per mille*. At the other end of the scale is Coorg with a rate of 166·1 *per mille*.

A comprehensive view of the rates of population growth in British India may be obtained from Table I (vi) which gives in the last column the average annual excess for ten-yearly periods from 1871 to 1930 and the excess for individual years from 1931 to 1937. In view of the separation of Burma

from India on 1st April, 1937, the figures from 1931 onwards are exclusive of Burma. This table also gives the trend of birth and death rates in India during the whole period.

TABLE I (vi).

	Annual number of births.	Birth rate per mille.	Annual number of deaths.	Death rate per mille.	Annual excess of births over deaths.
1871—1880	Not available.		3,540,202	20	..
1881—1890	4,565,687	24	5,058,578	26	—192,891
1891—1900	7,174,694	34	6,662,417	31	512,277
1901—1910	8,591,136	38	7,657,513	34	933,623
1911—1920	8,810,018	37	8,142,364	34	667,654
1921—1930	8,345,364	35	6,347,063	26	1,995,301
1931	8,814,836	35	6,404,990	25	2,409,846
1932	8,718,620	34	5,596,246	22	3,122,374
1933	9,317,918	36	5,870,336	23	3,447,582
* 1934	8,923,169	34	6,606,697	25	2,316,472
1935	9,299,021	35	6,331,576	24	2,967,445
1936	9,566,379	36	6,111,358	23	3,455,021
1937	9,388,457	35	6,112,375	22	3,276,082

In the period 1871-90 registration of vital statistics was less satisfactory than during succeeding years. Examination of the figures from 1891 onwards indicates that the birth rate has undergone little in the way of fluctuation. On the other hand, it is clear that in respect of the death rate a reduction has taken place from 1921 onwards. Whilst the average annual increase during 1921-30 was just under two millions, during the succeeding seven years the average increase has been over three millions, if Burma be included for the sake of comparison. These facts support the inference that the present decade is likely to present an even larger rate of growth, than that recorded during 1921-1931, provided no abnormal conditions supervene before the census of 1941.

Births according to the four quarters of 1937 are shown in table I (vii) for British India and the provinces :—

TABLE I (vii).

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
British India	2,264,516	2,039,862	2,407,397	2,676,682
N.-W. F. P.	18,992	16,692	17,474	19,369
Punjab	254,476	208,742	296,235	331,274
Delhi	6,447	5,719	9,111	9,866
U. P.	415,729	334,928	477,776	510,473
Bihar	258,866	246,007	286,745	309,039
Orissa	66,279	62,902	54,064	58,501
Bengal	483,726	364,070	342,282	516,972
C. P.	137,163	136,521	170,921	178,334
Bombay	166,139	172,646	197,938	192,753
Sind	19,568	15,731	19,833	22,257
Madras	361,905	418,965	474,466	446,326
Coorg	893	1,113	1,175	847
Assam	69,344	51,021	53,101	74,758
Ajmer-Merwara	4,989	4,805	6,276	5,913

* Excluding Burma.

In Northern India as a whole, except Ajmer-Merwara, and in the Central Provinces the largest number of births took place during the last quarter whilst, in Bombay, Madras, Coorg and Ajmer-Merwara, the maximum was recorded in the third quarter. Orissa alone had its maximum of births in the first quarter. How far inaccuracy in respect of the date of registration causes these variations cannot be estimated. In those provinces where Police Departments are responsible for registration of vital statistics in rural areas, it is known that an appreciable proportion of vital events of a particular month are recorded during the succeeding month. This question and others have been dealt with at some length in the paragraph dealing with registration (page 17), but it is mentioned here to emphasise the fact that no means exist at present for ensuring greater accuracy.

Deaths.

4. Deaths in British India during 1937 numbered 6,112,375 or about 1,000 more than during the previous year. The crude death rate was slightly lower than that of 1936, the rates being 22·4 and 22·7 *per mille* respectively.

Total deaths for each sex, the corresponding rates and combined death rates for the two sexes are given for British India and the different provinces in table I (viii). ...

TABLE I (viii).

	Deaths.			Death rate p. m.		
	M.	F.	Total.	M.	F.	Total.
British India .	3,188,686	2,923,689	6,112,375	22·7	22·1	22·4
N.-W. F. P. .	27,432	22,738	50,170	20·1	19·6	19·9
Punjab .	297,676	258,592	556,268	21·0	21·7	21·3
Delhi .	8,597	8,033	16,630	21·3	27·1	23·8
U. P. .	558,917	476,086	1,035,003	20·3	19·1	19·8
Bihar .	385,755	343,699	729,454	22·2	19·8	21·0
Orissa .	99,043	100,122	199,165	28·8	26·5	27·6
Bengal .	633,477	599,494	1,232,971	23·4	23·9	23·6
C. P. .	261,598	238,438	500,036	31·6	28·7	30·1
Bombay .	252,925	240,283	493,208	25·2	25·7	25·4
Sind .	26,442	20,418	46,860	11·1	11·0	11·1
Madras .	534,349	520,081	1,054,430	22·9	21·8	22·3
Coorg .	2,442	2,043	4,485	26·8	27·8	27·2
Assam .	90,875	85,179	176,054	20·5	21·3	20·9
Ajmer-Merwara	9,158	8,483	17,641	29·2	30·5	29·8
	M.—Male.			F.—Female.		

In last year's report, attention was drawn to the recorded rate in Sind which suggested a high degree of error in registration. This year no improvement has taken place, the recorded rate being 11·1 *per mille* as against 11·5 *per mille* in 1936.

Examination of urban mortality rates in the different provinces indicates a number of grave defects in the registration of deaths. In Bengal, Barrackpur with a population of over 25,000 recorded a death rate of 4·7 *per mille*, the average rate for the previous quinquennium being 5·3 *per mille* whilst in the town of Comilla with a population of 31,000 the death rate was only 6·5 *per mille*. Cuttack, in Orissa, registered a death rate of 10·6 with a population of over 65,000 whilst, in the Punjab, Sheikhpura, returned a rate of 8·5 *per mille* for a population of about 12,000. Again, Banda in the United Provinces with a population of about 22,500, recorded a death rate of 7·8 *per mille*. No province appears to be wholly exempt from such errors, although some are better than others.

Rural and urban death rates for British India and the provinces are given in tables G and H, Appendix I. For the country as a whole, the rural rate was 22·2 *per mille* and the urban 24·7 *per mille*. In most provinces the difference between these rates was small, whilst some others showed relatively large variations. In Madras the difference was 6·1 *per mille*, in Orissa 7·1, in Bihar 7·9, in U. P. 9·0, in Ajmer-Merwara 9·3, in Sind 10·1 and in Coorg 38·0. Exceptionally high urban death rates have been recorded in Coorg during the last three years, *e.g.*, 51 *per mille* in 1935, 52·5 *per mille* in 1936 and 63·1 *per mille* in 1937; this matter would seem to demand early investigation. The female death rate exceeded the male rate in the provinces of the Punjab, Delhi, Bengal, Bombay, Assam, Coorg and Ajmer-Merwara but the differences were small. In British India as a whole, the male rate slightly exceeded the female rate.

Maternity levies a heavy toll on the lives of women in this country and the death rate for women during the child-bearing age period, 15-40 years, is in every province except Bihar higher than that for men at the corresponding period. Table I (*ix*) gives the figures for 1937; they confirm the experience of past years.

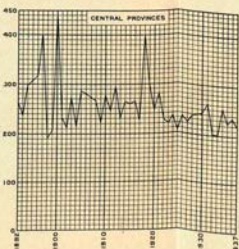
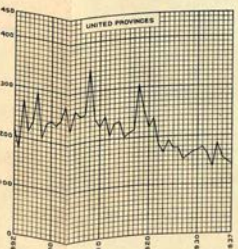
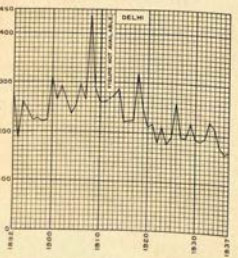
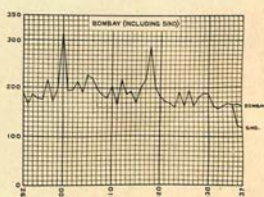
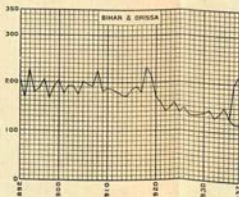
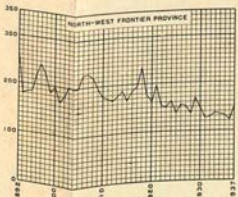
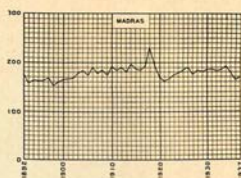
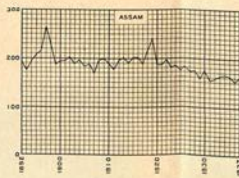
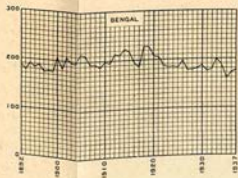
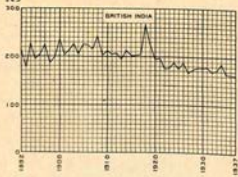
TABLE I (*ix*).

	Deaths, 15-40 years.		Death rates, 15-40 years.	
	Males	Females	Male	Female
British India:	539,849	611,187	9·4	11·1
N.-W. F. P.	5,327	5,097	9·8	10·6
Punjab	40,391	41,646	7·2	9·0
Delhi	1,263	1,703	6·4	12·9
U. P.	89,587	91,231	7·9	8·9
Bihar	81,149	74,954	11·8	10·6
Orissa	19,216	23,601	13·3	14·2
Bengal	127,071	158,527	11·2	14·7
C. P.	38,224	41,438	11·4	12·2
Bombay	35,505	42,488	8·4	10·9
Sind	5,937	5,612	5·6	7·0
Madras	75,105	98,182	8·1	9·8
Coorg	757	671	16·7	20·1
Assam	19,245	24,655	11·5	15·1
Ajmer-Merwara.	1,072	1,382	8·1	12·0

The necessity for a more detailed classification of causes of deaths has been emphasised repeatedly in these reports. The omnibus groups of 'fevers,' 'respiratory diseases' and 'other causes' require some separation into specific diseases, because only then can a more correct appreciation of the main causes of morbidity in the community be reached and a rational basis provided for preventive effort. This question will be discussed in a later paragraph, but it may be useful at this stage to examine the results of a scheme of verification carried out in Delhi city by the Medical Officer of Health during 1937. Of 9,660 deaths registered during the year, 9,481, or nearly 98 per cent., were verified. From the tabular statements included in the Health Officer's report, the following figures are quoted for certain specific causes of death under

INFANTILE MORTALITY RATES PER MILLE OF LIVE BIRTHS IN BRITISH INDIA & PROVINCES DURING THE YEARS 1892-1937.

BRITISH INDIA



the two heads "notified and registered causes of death" and "verified causes of death".

	Notified and registered cause of death.	Verified cause of death.
1. Malarial fever	5	236
2. Measles	123	123
3. Smallpox	575	575
4. Typhoid fever	395	388
5. Diabetes	10	13
6. Broncho-pneumonia	6	2,252
7. Pneumonia	1,035	568
8. Phthisis	516	882
9. Puerperal fever	1	50
10. Senile debility	29	661
11. Infantile diarrhoea	123	1,117
12. Premature birth	5	194

It is not possible to compare the two tables except by taking out the figures for certain causes of death. In some cases, the discrepancies are very large. The combined figures for pneumonias, for instance, show a difference of 1,779; infantile diarrhoea, premature births, phthisis and puerperal fever all show considerable variations, whilst for 'senile debility', the number recorded is no less than 632 in excess of the registered number. If the assumption is made that the "verified" causes of death give a greater measure of accuracy than the "notified and registered" causes; then the striking differences in numbers under such headings as pneumonia, puerperal fever, infantile diarrhoea and "premature birth" signify certain directions along which preventive measures should be taken.

Infantile Mortality.

5. The report for 1930 included graphs in which were plotted infantile mortality rates from 1892 onwards for British India and for the different provinces. These graphs have now been extended up to 1937. It is certain that, as in the case of other vital statistics, infantile mortality figures in India are subject to a large margin of error. Moreover, since the annual rates are influenced by the degree of accuracy in birth registration, the error tends to be further enhanced. It is difficult to determine how far these two factors are responsible for the shape of the provincial graphs. In some provinces, such as Delhi, U. P., C. P., Bombay and Punjab, the annual oscillations almost suggest that the graphs represent the incidence of some epidemic disease rather than that of infantile mortality; in other provinces, such as Bengal and Madras, the oscillations are markedly less. If, as is probable, any tendency towards a decrease in infantile mortality rate in recent years has been due to improved registration of births, in provinces such as Madras, where improvement of birth registration has undoubtedly taken place, the shape of the graph suggests that registration of infantile deaths has improved to a corresponding extent. The percentages of error in respect of birth and infantile death registrations are, however, so difficult of assessment that no interpretation of the provincial graphs has been attempted. They give a bird's eye view of rates recorded over a fairly long period and that provides the sole justification for their inclusion.

The subject of infantile mortality has been discussed in its administrative aspects in Section III of this report. Its relative incidence in the different provinces at different periods of the first year of life and its main causes are set out in Table I (x). The percentages given for England and Wales relate to (1) the first four weeks of infantile life (2) the age period from four weeks to six months and (3) that from six months to one year. Although the first two for England and Wales are not exactly identical with those for India, the differences are so small as to make comparison permissible.

TABLE I (x).

	Under one month.		One to six months.		6-12 months.		Total deaths under one year.	Death rate per 1,000 live births	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1937.	1936.
*England and Wales (1936) .		51·5		29·9		18·5			59
British India .	735,321	48·4	445,363	29·3	337,885	22·3	1,518,569	161·7	161·0
N.-W. F. P. .	4,069	37·9	3,453	32·0	3,236	30·0	10,778	148·6	121·7
Punjab .	77,355	43·5	50,405	28·3	50,075	28·2	177,835	163·0	158·4
Delhi .	1,642	31·6	1,989	38·3	1,557	30·0	5,188	166·6	162·8
U. P. .	103,016	41·6	85,228	34·4	59,259	23·9	247,503	142·3	148·5
Bihar .	64,629	50·7	37,818	29·7	25,081	19·7	127,528	115·9	118·0
Orissa .	26,393	50·9	16,469	31·7	9,081	17·4	51,893	214·7	198·8
Bengal .	168,331	56·0	85,137	28·3	47,302	15·7	300,770	176·2	170·9
C. P. .	67,034	49·2	38,331	28·1	30,807	22·6	136,172	318·6	235·0
Bombay .	45,316	38·6	39,397	33·6	32,546	27·8	117,258	160·7	166·1
Sind .	3,460	37·9	3,342	36·6	2,332	25·5	9,134	118·0	121·5
Madras .	152,931	52·9	68,693	23·8	67,296	23·3	288,920	169·8	164·1
Coorg .	433	48·5	255	28·6	205	23·0	893	221·7	181·3
Assam .	19,390	48·8	13,033	32·8	7,304	18·4	39,727	160·0	150·8
Ajmer-Merwara .	1,303	26·2	1,813	36·5	1,854	37·3	4,970	226·1	174·1

In most provinces the recorded rates for 1937 showed little difference from those of 1936. In Ajmer-Merwara, Coorg and N.-W. F. Province, however, large increases of as much as 52·0, 40·4 and 26·9 per 1000 births respectively were recorded, whilst in Orissa the increase was 15·9 *per mille*. In the C. P. a decrease of 16·4 *per mille* was reported.

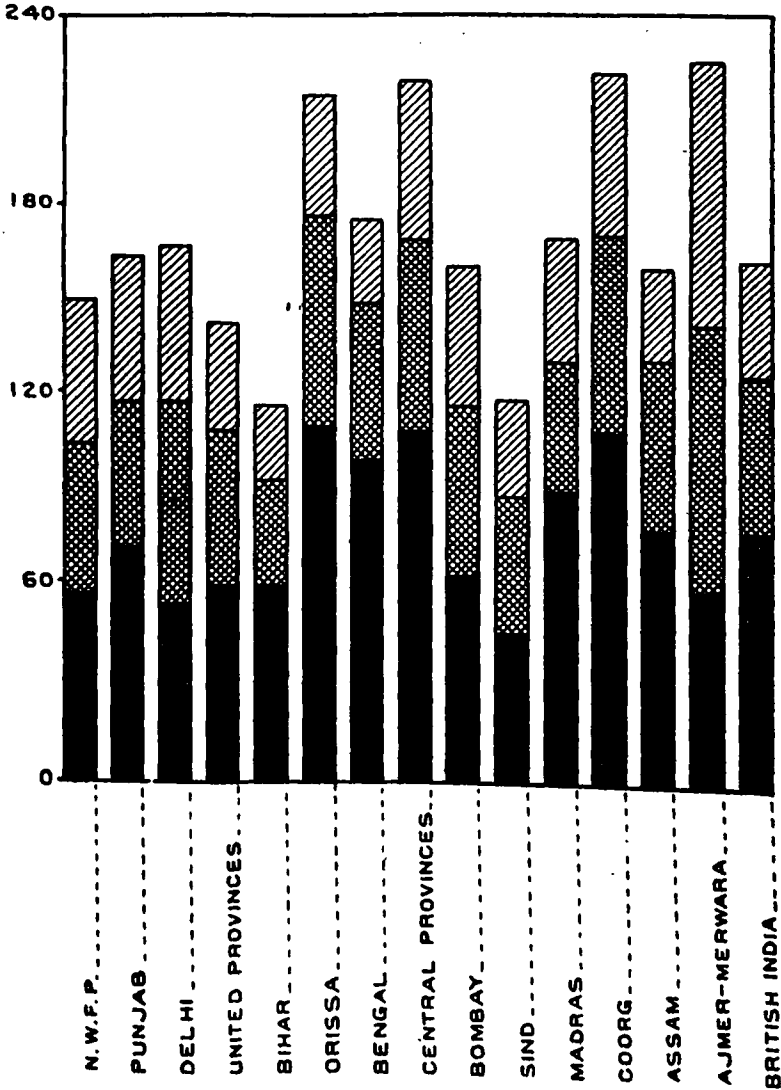
Of the total infantile deaths 48 per cent. took place within the first month of life, 29 per cent. between the first and sixth months and 23 per cent. during the second six months. The corresponding percentages in England and Wales during 1936 do not differ to any great extent, although the total infantile mortality rate was considerably less than half of that of this country.

Table I (xi) gives infantile deaths under one week as a rate *per mille* of live births and as percentages of the total deaths of infants within the first month and during the first twelve months of life. Corresponding figures for England and Wales for 1936 are included for purposes of comparison.

No 2

INFANTILE MORTALITY PER MILLE OF LIVE BIRTHS IN BRITISH INDIA DURING 1937

RATE P.M.



INDEX.

- Under one month.....
- One to six months.....
- Six to twelve months.....

TABLE I (xi).

	Deaths under one week.	Rate p. m. live-births.	Percentage of	
			Deaths under one month.	Total infant deaths.
England & Wales (1936)		21.9	72.6	37.4
British India	449,227	47.8	61.1	29.6
N.-W. F. P.	2,033	28.0	49.7	18.9
Punjab	43,518	39.9	56.3	24.5
Delhi	879	28.2	53.5	16.9
U. P.	66,255	38.1	64.3	26.8
Bihar	46,682	42.4	72.2	36.6
Orissa	15,337	63.4	58.1	29.6
Bengal	98,695	57.8	58.6	32.8
C. P.	35,607	57.2	53.1	26.1
Bombay	25,788	35.4	56.9	22.0
Sind	1,868	24.1	54.0	20.5
Madras	100,376	59.0	65.6	34.7
Coorg	261	64.8	60.3	29.2
Assam	11,166	45.0	57.6	28.1
Ajmer-Merwara	762	34.7	58.5	15.3

As may be seen from Table I (x), neonatal deaths or deaths under one month account for 48.4 per cent. of the total infantile mortality; of these 61 per cent. take place within the first week of life. Deaths occurring during the first month of life and particularly those during the first week are largely influenced by prenatal causes and the large numbers of deaths during these early age periods emphasise the importance of greater ante-natal care as an essential part of the campaign for saving infant life.

The percentages recorded in England and Wales show that, whilst the mortality under one week forms a much smaller proportion of the total live-births than that of India, the ratios in respect of the deaths under one month and of the total infantile deaths are higher.

Male and female infantile deaths are given below for British India and the provinces. For the country as a whole and in most of the provinces, the male was higher than the female death rate, exceptions being recorded in the N.-W. F. Province, Sind and Ajmer-Merwara.

TABLE I (xii).

	Infant deaths.		Rates per mille of corresponding live births.	
	Males.	Females.	Males.	Females.
British India	327,357	691,212	169.5	153.3
N.-W. F. P.	6,063	4,715	148.1	149.3
Punjab	97,543	80,292	169.9	155.4
Delhi	2,788	2,400	170.3	162.4
U. P.	137,081	110,422	148.6	135.2
Bihar	70,204	57,324	124.4	106.9
Orissa	27,655	24,238	222.8	206.1
Bengal	162,340	138,430	183.1	168.7
C. P.	73,884	62,288	230.7	205.8
Bombay	63,248	54,010	168.0	153.0
Sind	5,024	4,110	116.6	119.9
Madras	157,087	131,833	180.5	158.6
Coorg	468	425	226.3	216.8
Assam	21,350	18,377	166.5	153.2
Ajmer-Merwara	2,622	2,348	219.2	234.3

Little reliable information in respect of causes of death at different age periods is available in this country. This handicaps the development of successful preventive measures and, particularly in respect of infantile mortality, urgent need exists for investigation of the causes of death in different areas.

Under existing conditions, the only feasible way of collecting reasonably correct figures is through those urban and rural infant and child welfare centres which are now under the charge of medical women. Rural "Health Units", for instance, include medical women on their staffs and these specially trained medical officers ought to be able to obtain fairly accurate figures for the child populations under their supervision. Similarly, the centres organised by the larger municipal health departments and by the Red Cross Society should find it possible to contribute new and reliable information in the same direction. In this connection it may be of interest to quote certain figures from Calcutta. There, the Red Cross Society has built up a child welfare scheme under the supervision of a woman medical officer, whilst another centre is associated with the All-India Institute of Hygiene and Public Health, being under the charge of the Professor of Maternity and Child-welfare. The health visitors attached to these centres regularly visit the children on their registers and keep records of their health. The infants are also periodically examined by the woman doctor and, when death takes place, medical diagnosis of the cause can frequently be made with accuracy. Under these circumstances, the available statistics from these centres should give a much more true picture of the causes of mortality among infants than the ordinary public health returns provide. So far, the figures are small but, if rural and urban child-welfare organisations would make an effort, in a few years reliable figures of sufficient size would become available in different areas and these would be invaluable.

TABLE I (xiii).

Causes of death.	Combined figures for the infant welfare centres of Red Cross Society (1937).			Hygiene Insti- tute Welfare Centre (1936-1937). From birth to twelve months.
	Under one month.	One to twelve months.	Total.	
1. Prematurity	22	—	22	9
2. Tetanus	11	—	11	2
3. Congenital debility	8	6	14	..
4. Bronchitis and pneumonia	6	25	31	27*
5. Neglect and starvation	2	..	2	5
6. Asphyxia neonatorum	1	..	1	..
7. Jaundice	1	1	2	..
8. Umbilical hæmorrhage	1	..	1	..
9. Umbilical sepsis	1	1	2	3
10. Syphilis	1	..	1	2
11. Wrong feeding and starvation	..	20	20	..
12. Fevers	..	12	12	..
13. Diarrhoea and Dysentery	..	10	10	15†
14. Tuberculosis	..	2	2	3
15. Smallpox	..	1	1	16
16. Osteomyelitis	..	1	1	..
17. Convulsions	..	1	1	2
18. Measles	..	1	1	3
19. Boils	..	1	1	..
20. Accidents	..	1	1	..
21. Forms of Sepsis other than umbilical	..	..	..	5
22. Whooping cough	..	..	..	1
23. Rickets	..	..	..	2
24. Unknown	8	4	12	10
Totals	62	87	149	105

* Pneumonia.

† Gastro-intestinal diseases.

The figures for the Red Cross centres have been classified in two groups, "under one month" and "one to twelve months"; those for the Hygiene Institute centre are only in one group. The former shows that prematurity, tetanus and congenital debility taken together are responsible for 66 per cent. of the deaths under one month and that respiratory and gastro-intestinal diseases and fevers account for 54 per cent. of those occurring between one and 12 months. 'Wrong feeding and starvation' also takes a relatively high toll of life during this period, the proportion being nearly 23 per cent. of the total recorded between the first and twelfth months. The figures of the Hygiene Institute centre also show large numbers under "respiratory" and "gastro-intestinal diseases", whilst the 16 deaths from smallpox form nearly 15 per cent. of the total. Tetanus as a cause of neonatal mortality is generally due to umbilical infection and nearly 18 per cent. of the neonatal deaths in the Red Cross centres were due to this easily avoidable condition. Conditions like "prematurity" and "congenital debility" can be largely prevented by better ante-natal care, whilst respiratory and digestive diseases and wrongful feeding indicate that education in mother-craft is urgently required. In any case, most of these infantile deaths are preventable; the high proportion of smallpox deaths is particularly to be deplored since in vaccination we possess a powerful preventive weapon.

Table I (xiv) sets out the mortality figures for children under 10 years of age with the corresponding figures for England and Wales for 1936.

TABLE I (xiv).

	Under one year.	% of total deaths.	1-5 years.	% of total deaths.	5-10 years.	% of total deaths.	Total under 10 years.	% of total deaths.
England and Wales (1936) .	...	7.1	...	2.5	...	1.2	...	10.8
British India . . .	1,518,569	24.8	1,138,221	18.6	327,031	5.4	2,983,821	48.8
N.-W. F. P. . . .	10,778	21.5	10,609	21.1	3,064	6.1	24,451	48.7
Punjab	177,835	32.0	106,616	19.2	29,321	5.3	313,772	56.4
Delhi	5,188	31.2	3,719	22.4	684	4.1	9,591	57.7
U. P.	247,503	23.9	210,654	20.4	41,906	4.0	500,063	48.3
Bihar	127,528	17.6	151,399	20.8	46,430	6.4	325,357	44.6
Orissa	51,893	26.1	27,753	13.9	8,715	4.4	88,361	44.4
Bengal	300,770	24.4	200,497	16.3	86,545	7.0	587,812	47.7
C. P.	186,172	27.2	108,279	21.7	24,817	5.0	299,268	53.8
Bombay	117,258	23.8	106,794	21.7	21,358	4.3	245,410	49.8
Sind	9,134	19.5	6,987	14.9	2,666	5.7	18,787	40.1
Madras	288,920	27.4	172,787	16.4	48,184	4.6	509,891	48.4
Coorg	893	19.9	521	11.6	199	4.4	1,613	36.0
Assam	89,727	22.6	26,891	15.3	12,550	7.1	79,168	45.0
Ajmer-Merwara . . .	4,970	28.2	4,715	26.7	592	3.4	10,277	58.3

In interpreting these figures, it must be remembered that errors in statements of age may vitiate the percentages. Taking the figures as they stand, however, it will be seen that infantile mortality accounts for nearly a quarter of the total deaths during 1937. At succeeding age periods, the proportions progressively decrease, although the mortality under 10 years of age is nearly half of the total for all ages. These figures emphasise the importance of child welfare work, including medical care of children during the pre-school age period of one to five years and of the pupils of elementary schools whose population belongs preponderantly to the age group, 5-10 years. The contrast provided by the English figures brings out the fact that, with organised effort, it should be possible to obtain a marked reduction of child mortality in India.

The question is frequently asked if the saving of weak and defective infants is not detrimental to the welfare of the community by increasing the numbers of the unfit. Experience in England, where remarkable progress in the reduction of infant mortality has occurred during the past few decades, by no means supports this view, for that reduction has been accompanied by a corresponding decline in the mortality rates of all subsequent age-periods. On this question, the Chief Medical Officer of the Ministry of Health remarks that :

" at ages 1-2, 2-3, 3-4, and 4-5 the rate of mortality in 1926-32 was less than one quarter of the corresponding rate in 1861-70 and less than one half the rate of 1901-10. Even in the years of adolescence, 15-20, where some slackening in the rate of decline is observed, the death-rate in 1921-30 was only 39 per cent. of that registered in 1861-70. So far then as rates of mortality are to be trusted, it is certain that the spectacular fall of infant mortality within the century has not been associated with any deterioration of mortality rates at later ages. That improvement of the environmental conditions of infancy has been at the expense of later ages is a proposition unsupported by any evidence ".

Still-births.

6. The figures for still-births in British India and the different provinces are given below :—

TABLE I (xv).

	Male.	Female.	Total.	Rate <i>per mille</i> live-births.
British India	115,203	91,525	206,728	22·0
N.-W. F. P. . .	112	108	220	3·0
Punjab . . .	5,305	3,607	8,912	8·2
Delhi . . .	261	223	484	15·5
U. P. . . .	8,266	6,449	14,715	8·5
Bihar . . .	16,471	13,141	29,612	26·9
Orissa . . .	7,104	5,901	13,005	53·8
Bengal . . .	42,968	34,655	77,623	45·5
C. P. . . .	8,850	7,083	15,938	25·6
Bombay . . .	6,770	5,280	12,050	10·5
Sind	560	459	1,019	13·2
Madras . . .	13,086	10,276	23,362	13·7
Coorg . . .	46	42	88	21·8
Assam . . .	5,304	4,218	9,522	38·4
Ajmer-Merwara .	100	78	178	8·1

Provincial still-birth rates show wide variations, the figures ranging from 3·0 *per mille* of live-births in N.-W. F. Province to 53·8 *per mille* in Orissa. The very low rates are undoubtedly due to defective registration. The obstetrical histories of 414 multiparæ attending the child welfare centre attached to the Hygiene Institute at Calcutta were carefully collected. From a total of 1,615 pregnancies, there were 1,372 live infants, 71 still-births and 173 abortions. These give a still-birth rate of 51·7 *per mille* of live births which is almost certainly much closer to actual facts than some of the figures given above. Even in England and Wales, although complete records of still-births are not available, the registered rate for 1937 was 41·0 *per* 1,000 live births.

Registration and Compilation of Vital Statistics.

7. The urgent importance of improving the vital statistics of India has been stressed from time to time in these reports, but no apology need be made for further remarks on this question, because accurate knowledge of morbidity and mortality in urban and rural areas constitutes the very basis of most public health effort. Whilst it is recognised that considerations of cost stand in the way of providing trained personnel for the large rural population of this country, it cannot be stated too often that improvements are possible without any great additional expenditure. It should also be possible to correct certain defects in compilation, which are partly responsible for the present inaccuracies in provincial vital statistical returns.

There is little doubt that the more general introduction of compulsory registration would go far to effect improvement. In areas where compulsion is in force, however, the law is seldom enforced and a few selected prosecutions would undoubtedly have a salutary effect.

That considerable improvement in registration can be effected where medical officers of health are employed, may be judged from the following figures of unregistered births and deaths detected during 1937 in urban and rural areas, with and without health officers.

	Urban areas.		Rural areas.	
	Births.	Deaths.	Births.	Deaths.
With health officers	25,724	9,695	64,289	22,042
Without health officers	3,639	2,301	19,809	7,053

The disparity between the figures for areas with and without health officers becomes all the more striking when it is remembered that, for British India as a whole, in nearly half the districts and in about three-quarters of the municipalities, no qualified health officer is employed. It was pointed out in last year's report that, with respect to similar figures for 1936, Madras Presidency contributed by far the largest percentage. This remark applies equally to the figures for 1937. It is to be noted that the *nil* statements are due to the fact that in Madras Presidency health officers have been provided in every district of the province.

Madras Presidency.

	Urban areas.		Rural areas.	
	Births.	Deaths.	Births.	Deaths.
With health officers	17,087	7,987	33,093	10,797
Without health officers	1,488	936	..	..

It is to be regretted that the work of detection of unregistered vital statistics is not yet being carried out with vigour in all parts of the country. If every health officer in India would give more attention to the supervision of his registrars, to the inspection of birth and death registers and to the detection of omissions, the vital statistics of the area under his charge would show rapid improvement and would soon form a much more valuable guide to preventive work.

In a recent memorandum on vital statistics prepared for the second meeting of the Central Advisory Health Board, some of the steps that might be taken for improvement of the vital statistics of India were discussed and the following paragraphs may be quoted from that memorandum:—

In provincial capitals and in a number of other large cities, the appointment of medical registrars, with the object of obtaining medical certification before disposal of the dead, constitutes the first step. Supervision of their work is an essential part of the health officer's duty. In these large urban areas, too, the independent medical profession should be induced to assist and, as a proportion of the deaths takes place in the hospitals which exist in these cities, the certification of all such deaths should offer little difficulty. For the registration of the larger numbers of deaths not included in these two categories, responsibility should rest with the local authority's medical registrars. Part of their time should be spent in outdoor investigation; this would also give opportunities for the detection of the causes of some at least of the large numbers of unclassified deaths.

For other towns of lesser size and importance, it may not be possible for financial reasons to appoint medical registrars. Some improvement, however, could be obtained if provincial Governments would prescribe certain minimum educational qualifications for persons holding the posts of registrars. In addition, every provincial public health department should organise instructional courses for the training of candidates for these posts. These courses should include instruction in respect of "nomenclature" and the more important signs and symptoms of the commoner diseases. If the courses were held in a large centre where medical registrars were employed, the candidates could be given practical outdoor training by these registrars. In addition, it should be possible to give elementary lessons in the methods of tabulation of figures, in the calculation of rates and in the preparation of the monthly and other returns in use. It may be argued that such a scheme is beyond the bounds of possibility in this country, but if the vital statistics of India are to obtain a reasonable degree of accuracy,—and those who have knowledge and experience of this subject are unanimously impressed with its importance,—then some scheme of the kind will have to be introduced sooner or later and sooner rather than later. In time, indeed, recruitment to the posts of registrars of births and deaths should be definitely limited to persons who have successfully undergone a prescribed course of training and instruction.

In rural areas the problem is much more difficult. The replacement of the village watchman by a more efficient registration agency is at present outside the range of practical politics, partly because of the cost involved and partly because of the large numbers of registrars required to cover the vast rural population spread over hundreds of thousands of villages. Improvements can, however, be effected by other means. Mention has already been made of the efforts made by certain provincial health staffs in the detection and recording of unregistered births and deaths. If individual health officers showed real interest in the subject, inspected the birth and death registers in every village visited during their tours and took steps to ensure that their subordinate staffs co-operated with village headmen in this matter, marked progress would quickly be made. It will be noticed that this method depends on the general employment of district health officers. If the reorganisation and expansion of health staffs which was the subject of a unanimous resolution at the 1937 meeting of the Central Advisory Board of Health, were generally brought into force, vital statistics all over the country would soon give a much more accurate picture of actual facts than they have hitherto presented.

In Madras Presidency, since 1926, every district has had a trained health officer and from the very commencement of that service, the importance of improving registration of births and deaths was repeatedly brought home to every health officer. During the early life of the new organisation, many thousands of unregistered births and deaths were detected each year by the health officers and their health inspectors and vaccinators. As proof of the improvement which was effected, the figure given in the Director of Public Health's report for 1931 of the estimated population of the province, which was based on the vital statistics of the ten-year period 1921-1931, showed an error only of 0.05 per cent. when the 1931 census figures were made available. What can be done in one province should be possible of achievement in others, but the foundations for that achievement rest on the existence of a trained health staff in every district and in every municipality.

In regard to greater accuracy in the registration of causes of deaths little seems possible except perhaps in restricted areas. The suggestion is made that the services of rural medical practitioners, either subsidised or wholetime servants of provincial or local authorities, might be utilised for the supervision of registration in the rural villages coming within their ambit. If village registers were submitted to these medical officers, say once a week, they should be able to make such local enquiries as might be necessary, to

elucidate facts and to advise the village officer generally in respect of the entries. For instance, if a series of cases of diarrhoea occurred or a rise in the incidence of fevers was made evident, the medical officer's attention would thus be drawn to the wider question of the community's health, apart from the limited view obtained by him from the section of population attending his dispensary. Regular inspections of this kind could, therefore, be used not only for the improvement in the registration of vital statistics but they would bring to earlier notice outbreaks of epidemic disease. It is realised that such a scheme at present would only be possible in restricted areas, but as the tendency seems to be to expand the system of subsidised rural medical practitioners, there seems to be every advantage in utilising the services of those practitioners in this manner.

As regards the compilation of vital statistics, Madras Presidency alone possesses a central organisation in the office of its Director of Public Health to which returns are sent from every village and town of the province. In other provinces, compilation is affected in intermediate stages and, only after district figures are consolidated, are they sent to Directors of Public Health.

In considering this question, attention must be paid both to the speed and completeness with which the vital statistics recorded in different parts of a province are made available at headquarters. A recent examination of provincial returns carried out in the office of the Public Health Commissioner showed that the totals of the weekly figures supplied by the provinces differed widely from the annual figures published in the provincial health reports. For instance, in one province, the cholera mortality figures given in the annual reports for 1927, 1928, 1929 and 1930 were almost twice those of the consolidated weekly figures. These large differences may partly be explained by the fact that only a proportion of the local returns reached the office of the Director of Public Health in time for the weekly compilation which must be completed by a fixed day each week. In certain provinces, the wide areas and imperfectly developed communications probably make this defect inevitable. On the other hand, in the case of other provinces, only small differences were found to exist between the weekly totals and the totals published in their annual health reports; in fact, in one province, the two sets of figures for 1927, 1928, 1929 and 1930 were identical,—a coincidence which at once gives rise to suspicion. On investigation, it was found that the time elapsing between the last day of the week to which the return related and the date of its despatch from the office of the Director of Public Health was about three days. It is difficult to imagine that every village and urban return could have been received and compilations completed within this brief period and the probability is that an appreciable percentage of the local returns were originally missing and that no attempt was later made to make final corrections of the totals. It is this kind of slipshod carelessness which makes Indian public health statistics much less correct than they need be.

In view of the impossibility of speeding up the receipt of returns from the more remote parts of a province, the only satisfactory alternative is to revise the preliminary figures of a given week during subsequent weeks. In Madras Presidency, revision is made during each of the two subsequent weeks and a recent investigation has given interesting results. "Reports regarding 269 attacks and 97 deaths from cholera which occurred during the course of twenty days were tabulated to see what the intervals were between the dates of occurrence and the dates of receipt of reports in the Director's Office".

Interval in days between the date of occurrence of the event and the date of receipt of its report in the Director of Public Health's Office :—	Attacks.	Deaths.	Percentage to total	
			Attacks.	Deaths.
1 day	7	1	2.6	1.0
2 days	50	23	18.6	23.7
3 days	105	36	39.0	37.1
4 days	160	57	59.4	58.8
5 days	205	69	76.2	71.1
6 days	224	77	83.3	79.4
7 days	243	83	90.3	85.6
8 days	245	84	91.1	86.6
9 days	247	85	91.8	87.6
10 days	249	86	92.6	88.7
11 days	251	88	93.3	90.7
12 days	253	88	94.1	90.7
13 days	263	94	97.7	96.9
16 days	265	96	98.5	99.0
17 days	269	97	100.0	100.0

Over 59 per cent. of the attacks registered in different parts of the province were received within four days of their occurrence and about 90 per cent., within seven days. Within a fortnight, 98 per cent. of the cases were reported. Taking three days as the average time for the postal transmission of information to headquarters, in view of the extensive area of the province and of the difficulty of communications in many areas, it is obvious that the present organisation has attained a considerable measure of success in the collection of epidemiological intelligence. Although the number of cases investigated was small, it is sufficient to indicate the degree of betterment which has been reached. No remarks are called for in respect of the reported deaths, as the differences in the intervals between reports of attacks and reports of deaths were negligible.

Whilst for purposes of investigation, these Madras figures have been classified in intervals of days, epidemiological figures are usually reported in relation to the week of occurrence. An analysis of the Madras cholera figures for 1936 was, therefore, made on the latter basis. It was found that the great majority of these figures was reported within three weeks of their occurrence. Assuming for the moment that reports were completed within this period, only about 30 per cent. were reported during the actual week of occurrence, whilst 95 per cent. were reported before the end of the succeeding week. The remaining five per cent. were reported during the third week.

The Madras Public Health Department has, therefore, adopted the useful procedure of submitting preliminary figures for the week ending the previous Saturday and of following this up with revised figures for the same period during the two subsequent weeks. This is a procedure which might with great advantage be adopted by all other provinces. At present, the United Provinces and the Punjab submit additional figures to supplement the returns relating to specific weeks but, from other areas, supplementary figures are only occasionally supplied.

Experience in Madras has shown that the scheme of centralising the compilation of provincial vital statistics is much more efficient and much less expensive than those under which a number of intermediate agencies are successively concerned. The Director of Public Health's 1937 annual report contains the following remarks on this subject :—

“ The centralisation of the work of compilation of vital statistics in the office of the Director of Public Health was found to be more efficient and economical and as a result the scheme has been made permanent during the year. The monthly returns of births and deaths in villages are collected by the tahsildar from the village headmen at the end of each month and forwarded to the Director of Public Health while the municipal returns are submitted direct by the executive authorities. Although some of the village returns were received late for inclusion in the monthly vital statistical statements, every effort was made to ensure that the annual vital statistical figures were as complete as possible. Out of a total of 420,000 monthly returns from villages, only 784 returns of minor villages were not received in time for inclusion in this report. These represent only 0.18 per cent. of the total and are not likely to affect the rates materially.

“ When the birth or death rate in a rural town was found to be defective in any month, a special investigation was made with the co-operation of the district collector to see whether these low rates were due to defective registration, to incomplete returns or to some other cause ”.

Control of compilation by the Director of Public Health has therefore resulted in securing almost complete returns from all over the province and in ensuring prompt action for the correction of defective registration. This method for the improvement of vital statistics is one which merits the considered attention of all other provincial and State Governments and their public health departments. It is interesting to note that the Government of Mysore impressed with the necessity for improving their vital statistics records, have this year introduced a very similar scheme.

Indian States.

8. Vital statistics relating to as many Indian States as have submitted their returns are given below :—

TABLE I (xvi).

State.	Estimated population on 30th June 1937.	Births.	Birth rate per mille.	Deaths.	Death rate per mille.	Deaths under one year.	Infantile mortality per 1,000 births.
Jammu and Kashmir†	3,852,530	101,135	26	70,809	18	13,098	120
Patiala	1,705,181	63,586	37	29,083	18	6,122	96
Nabha	302,926	10,036	33	5,622	19	284	28
Kapurthala	337,328	9,115	27	4,004	12	885	97
Bahawalpur	1,113,445	17,816	16	10,114	9	•	•
Jind	335,120	16,034	48	6,840	20	•	•
Sirmoor	153,731	2,444	16	2,052	13	349	143
Faridkot	173,041	8,008	50	3,571	21	1,423	164
Malerkotla	84,514	2,322	27	1,048	12	187	81
Chamba	150,037	1,681	11	1,564	10	15	9
Kalsia	61,419	2,571	42	1,348	22	404	157
Pataudi	19,307	697	36	487	25	125	179
Dujana	29,723	1,275	43	609	20	177	139
Nahargarh	52,010	863	17	569	11	119	138
Mandi	221,064	7,206	33	4,601	21	990	137
Suket	60,902	1,477	24	1,106	18	•	•
Bilaspur	102,888	3,238	31	2,180	21	523	102
Bastar	563,088	15,825	28	9,276	16	2,275	144
Changbhakar	24,272	578	24	474	20	42	73
Chilpukhadan	35,183	1,081	31	938	27	345	319
Jashpur	218,740	5,201	24	3,505	16	780	152
Kalahandi	575,634	22,026	39	12,618	22	3,762	100
Kanker	143,207	5,017	35	2,340	16	694	138
Khairagarh	178,547	6,065	34	4,404	25	1,378	227
Kawardha	79,812	3,113	39	2,240	28	900	289
Koreia	96,277	2,832	29	1,961	20	628	186
Nandgaon	203,172	7,862	39	5,102	40	2,197	279
Patna	612,682	22,711	37	13,439	22	4,278	188
Raigarh	300,331	8,661	29	5,065	20	1,330	154
Sakti	52,803	1,823	34	1,254	24	445	244
Sarangarh	136,056	4,162	31	2,674	20	685	165
Surguja	548,253	10,591	19	6,737	12	•	•
Udaipur	114,591	3,068	32	1,990	17	•	•
Athgarh	55,088	1,704	31	1,249	23	357	210
Athmalik	67,135	2,377	35	2,123	32	716	301
Banra	161,380	5,773	36	3,304	20	1,053	182
Baranba	51,793	1,014	37	1,636	32	502	204
Baudh	142,113	4,191	29	3,364	24	1,036	247
Bonni	87,792	3,188	36	2,350	27	662	208
Daspalla	49,032	1,937	40	1,540	32	579	209
Dhenkanal	316,398	10,681	34	6,075	29	2,701	258
Gangpur	386,694	13,235	34	8,423	22	2,159	163
Hindol	55,407	1,846	33	1,639	30	510	276
Keonjhar	511,979	18,957	37	14,891	29	3,543	187
Khandpara	86,568	3,870	45	2,533	29	949	245
Kharawan	46,764	1,218	26	694	15	191	157
Narasinghpur	45,860	1,881	41	1,379	30	450	230
Nayagarh	154,794	6,589	43	4,248	27	1,582	240
Nitgiri	70,728	2,033	29	1,890	27	920	207
Pal-lahata	30,628	1,168	38	968	32	305	261
Rairakhol	38,554	1,223	32	1,080	28	362	206
Sonapur	244,994	6,956	28	5,255	21	1,481	213
Tigiria	28,172	404	25	768	27	200	288
Ranput	51,738	1,893	27	1,162	22	363	261

* Figures not available.

† Figures are for the Fasil year 1933-34 corresponding to 16th October 1936 to 15th October 1937.

Indian States—*contd.*TABLE I (xvi)—*contd.*

State.	Estimated population on 30th June 1937.	Births.	Births rate <i>per mille.</i>	Deaths.	Death rate <i>per mille.</i>	Deaths under one year.	Infantile mortality per 1,000 births.
Seralkela . . .	161,467	3,109	19	2,246	44	395	124
Talchor . . .	81,539	3,207	39	913	11	255	80
Mayurbhanj . . .	975,356	30,599	31	22,092	23	4,091	134
Cooch Behar . . .	589,840	11,868	20	11,855	20	1,390	118
Akalkot . . .	99,800	3,748	33	2,044	20	162	43
Bhor . . .	143,595	5,478	37	3,791	26	987	130
Jamkhadi . . .	122,572	4,486	37	2,308	20	535	119
Miraj (Junior) . . .	44,524	1,610	36	862	19	191	119
Phaltan . . .	64,030	2,036	32	1,311	20	349	171
Ramdurg . . .	36,411	1,432	39	803	22	129	90
Savanur . . .	22,530	923	41	501	22	69	74
Kurundwad (Junior) . . .	42,940	1,933	45	965	22	246	127
Miraj (Senior) . . .	101,152	2,330	23	1,886	19	233	121
Aundh . . .	84,075	3,404	40	1,992	24	•	119
Kurundwad (Senior) . . .	47,649	1,998	42	1,027	22	211	106
Mudhol . . .	64,536	2,489	39	1,260	20	245	98
Sangli . . .	251,951	10,242	36	5,680	20	1,225	120
Sawantwadi . . .	245,884	7,099	31	4,443	18	852	111
Kolhapur . . .	989,760	37,068	37	21,330	22	3,017	81
Janjira† . . .	95,296	5,098	51	2,783	28	619	124
Jath . . .	96,451	3,481	36	1,721	18	343	99
Balasnor . . .	57,908	2,306	40	1,337	23	337	146
Bansda . . .	54,304	1,235	23	757	14	83	67
Baria . . .	173,451	2,198	13	1,824	11	•	•
Baroda . . .	2,643,451	95,595	36	60,288	23	14,250	149
Cambay . . .	97,926	3,493	36	2,591	26	769	220
Chhota Udepur . . .	156,635	3,337	21	1,646	11	307	92
Dharampur . . .	122,709	2,946	24	1,346	11	88	30
Jawhar . . .	62,074	2,058	33	1,673	27	93	45
Lunawada . . .	102,781	1,650	16	1,454	14	201	122
Rajpipla . . .	229,936	8,102	35	6,046	26	1,214	150
Sachin . . .	23,456	844	36	471	20	106	126
Sant . . .	91,486	2,144	23	1,225	13	234	132
Agar . . .	3,586	150	42	133	37	35	233
Bhaderwa . . .	11,985	351	29	263	22	67	191
Gad Boriad . . .	13,625	290	21	136	10	39	134
Jambughoda . . .	12,557	415	33	204	16	60	145
Kadana . . .	13,947	567	30	273	14	295	520
Mandwa . . .	6,534	106	16	122	19	37	349
Palasni . . .	3,068	86	28	50	16	18	209
Sanjeli . . .	8,894	277	31	114	13	29	105
Sihora . . .	4,948	114	23	64	13	12	105
Sanor . . .	2,017	78	39	59	29	25	321
Surgana . . .	15,454	297	19	106	7	17	67
Uchad . . .	3,660	128	35	105	29	35	273
Umeta . . .	7,101	340	48	234	33	122	359
Vajirra . . .	5,696	228	40	180	32	35	154
Pandu Mewas . . .	22,486	540	24	392	17	94	174
Hyderabad . . .	15,680,255	164,753	11	129,316	8	•	•
Mysore . . .	6,923,628	146,737	21	102,118	15	15,567	106

* Figures not available.

† According to the Census of 1931.

Such low rates for births as 11 and 16 *per mille* and for deaths as seven and eight *per mille* are undoubtedly due to defective registration of these vital events. Infantile mortality rates of nine, 28 and 30 *per mille* are low even for the progressive countries of the West, where much is being done for saving infantile life, and there can be no doubt that these rates are also due to defective registration.

Rainfall.

9. Taking the year as a whole, rainfall was in slight to moderate excess in the Bay Islands, Sind, Gujarat, west Central India, Berar, the Central Provinces and southeast Madras ; in slight defect in the west United Provinces, the southwest Punjab, Kashmir and Baluchistan, and normal elsewhere. Averaged over the plains of India, the year's total rainfall was in excess by one per cent.

During January and February, rainfall was in large excess in Bengal, Orissa, Chota Nagpur, Bihar, the United Provinces, the Punjab, Sind, west Rajputana, Hyderabad, the Madras Deccan and the north Madras coast ; in slight to moderate excess in the North-West Frontier Province, east Central India, the Central Provinces and Mysore; normal in Assam, Kashmir, Baluchistan, the Konkan, the Bombay Deccan and Malabar; and in slight to moderate defect elsewhere.

The total rainfall of the hot weather period March to May was in large excess in Berar, the Central Provinces, Hyderabad and the Madras Deccan ; in slight to moderate excess in Orissa, Bihar, the southwest Punjab, the Bombay Deccan, Mysore, southeast Madras and the north Madras coast ; normal in the Bay Islands, Bengal, the east and north Punjab, the North-West Frontier Province, Baluchistan, the Konkan and Malabar ; in slight to moderate defect in Assam, Chota Nagpur, the United Provinces, Kashmir, Sind and Central India ; and in large defect elsewhere.

During the monsoon season June-September, the total rainfall was in slight to moderate excess in Gujarat, west Central India, Berar and the Central Provinces ; normal in the Bay Islands, north-east India, the east United Provinces, Sind, Rajputana, east Central India, the Konkan, the Bombay Deccan, Malabar and southeast Madras ; and in slight to moderate defect elsewhere.

The total rainfall for the period October to December was in large excess in the Bay Islands, Bihar, Kashmir, Sind, Berar and the west Central Provinces ; in slight to moderate excess in Chota Nagpur, the east United Provinces, the east and north Punjab, the Konkan, north Hyderabad and southeast Madras ; normal in Assam, Bengal, the North-West Frontier Province, west Rajputana, east Central India, the east Central Provinces, the Bombay Deccan, Malabar and the Madras Deccan ; in slight to moderate defect in the west United Provinces, the southwest Punjab, east Rajputana, west Central India, south Hyderabad, Mysore and the north Madras coast ; and in large defect elsewhere.

Table I (*xvii*) gives the figures of actual rainfall compared with normal in the various provinces in each of the four periods.

TABLE I (contd.).
Rainfall in inches.

	January to February.		March to May.		June to September.		October to December.		Total	Departure from normal.
	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.		
Mean of India*	1.8	1.1	4.8	4.7	32.7	33.1	4.6	4.3	43.9	43.2
N.-W. F. P. . .	3.4	2.5	3.9	4.2	5.8	8.0	1.3	1.2	14.4	15.9
Punjab . . .	3.3	1.9	2.1	1.9	12.4	15.3	1.0	0.8	18.7	20.0
U. P.	2.7	1.5	1.1	1.4	10.2	33.5	1.6	1.8	34.6	38.1
Orissa	3.0	1.5	6.5	5.7	40.2	43.6	3.1	6.8	59.7	67.5
Bihar	3.1	1.4	3.7	3.5	39.8	42.0	7.1	2.9	53.7	49.7
Bengal	3.2	1.3	14.3	12.0	54.7	54.5	6.4	5.0	75.7	74.3
C. P.	1.6	1.3	4.5	1.6	45.5	40.6	4.2	2.7	55.7	46.3
Bombay	0.2	0.2	1.7	1.5	43.5	39.4	3.5	3.4	48.9	44.5
Madras	1.4	1.2	7.5	6.0	26.1	28.5	17.1	16.2	52.0	51.9
Assam	2.1	2.2	18.9	25.0	62.0	66.1	6.9	7.0	89.9	100.3
Sind	1.0	0.3	0.3	0.5	5.7	5.2	0.7	0.3	7.7	6.3
Rajputana . .	0.7	0.6	0.3	0.9	19.4	19.1	0.5	0.8	21.0	21.3
Central India .	0.9	0.8	9.5	9.9	37.6	33.1	1.1	1.6	49.1	36.4
Hyderabad . .	1.1	0.5	5.2	2.0	20.6	26.5	3.9	3.7	30.8	32.7
Mysore	0.4	0.3	7.5	5.3	18.9	22.4	7.2	8.2	34.1	36.2

*Excluding Burma.

Agricultural and Economic Conditions.

10. Table I (xviii) gives the cultivated and uncultivated acreage in British India and different provinces during the years 1936-37 and 1937-38.

TABLE I (xviii).

Area cultivated and uncultivated in each province.

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallow.	Culturable waste other than fallow.	Not available for cultivation.
British India	{ 1937-38	213,512,956	45,684,723	91,968,759	92,224,730
	{ 1936-37	213,763,258	44,835,433	92,186,104	93,552,210
N.-W. F. P. .	{ 1937-38	2,109,029	576,056	2,851,700	2,687,052
	{ 1936-37	2,317,893	409,883	2,811,357	2,684,673
Punjab	{ 1937-38	27,317,578	3,695,782	14,164,936	13,021,910
	{ 1936-37	27,905,978	3,220,828	14,120,422	12,958,234
Delhi	{ 1937-38	213,444	11,161	65,305	78,502
	{ 1936-37	214,186	11,513	62,674	80,558
U. P.	{ 1937-38	36,171,073	2,637,755	9,988,955	9,887,964
	{ 1936-37	36,166,954	2,601,588	10,037,803	9,884,560
Bihar	{ 1937-38	19,323,400	6,970,527	5,123,622	6,294,248
	{ 1936-37	19,916,600	6,542,460	5,133,501	6,292,366
Orissa	{ 1937-38	6,447,555	1,736,964	3,571,049	6,211,433
	{ 1936-37	6,486,300	1,695,473	3,613,873	6,172,556
Bengal	{ 1937-38	24,728,100	4,926,500	5,753,822	9,433,039
	{ 1936-37	24,466,300	4,690,883	5,949,866	9,692,231
C. P.	{ 1937-38	24,537,804	3,805,214	13,992,370	4,899,410
	{ 1936-37	24,593,915	3,746,418	13,985,674	4,906,582
Bombay	{ 1937-38	28,715,213	5,059,224	858,388	5,722,961
	{ 1936-37	28,154,019	5,593,158	877,950	5,683,376
Sind	{ 1937-38*	5,140,479	4,873,248	5,899,512	13,548,576
	{ 1936-37	4,754,583	5,104,775	5,738,561	13,706,511
Madras	{ 1937-38	32,031,679	9,451,438	10,537,675	14,603,510
	{ 1936-37	31,705,506	9,490,967	10,792,613	15,738,957
Coorg	{ 1937-38	144,673	164,667	11,690	359,474
	{ 1936-37	142,402	166,938	11,690	334,045
Assam	{ 1937-38	6,285,766	1,601,597	18,556,570	4,577,400
	{ 1936-37	6,613,476	1,345,522	18,756,295	4,577,400
Ajmer- Merwara.	{ 1937-38	337,133	174,590	263,165	899,251
	{ 1936-37	325,146	215,007	293,825	840,161

*Provisional figures.

Table I (*xix*) gives the areas in acres under food crops in British India and the provinces.

TABLE I (*xix*).

	Areas under food grains.	Areas under other food crops.	Total areas under food crops.
	Acres.	Acres.	Acres.
British India.	186,762,514	10,559,823	197,322,337
N.-W. F. P.	2,112,929	138,136	2,251,065
Punjab	21,411,088	932,505	22,343,593
Delhi	201,900	12,877	214,777
U. P.	38,064,875	3,125,458	41,190,333
Bihar	19,687,400	1,611,300	21,298,700
Orissa	6,132,154	271,091	6,403,245
Bengal	24,018,000	1,579,100	25,597,106
C. P.	19,864,397	291,840	20,156,237
Bombay	20,181,387	478,015	20,659,402
Sind	4,296,211	60,744	4,356,955
Madras	25,099,754	1,523,465	26,623,219
Coorg	89,089	15,063	104,152
Assam	5,301,075	501,806	5,802,881
Ajmer-Merwara	302,255	18,423	320,678

The figures are provisional.

A comparison of these figures with those for 1936 shows that, for British India and for the majority of provinces, decreases have occurred in respect of (1) areas under food grains and (2) of areas under other crops. In regard to the first increases were recorded only in the provinces of Bengal, Bombay and Ajmer-Merwara and in regard to the second Delhi, Orissa, Coorg and Ajmer-Merwara.

For detailed information regarding agricultural conditions the provincial Season and Crops Reports should be consulted.

Famine relief.

11. During 1937-38, scarcity conditions prevailed in the following areas :—

Bombay.—There was acute scarcity and shortage of fodder in one taluk of Sholapur district and throughout Bijapur district. The following provision was made in the scarcity areas in addition to suspensions and remissions of land revenue :—

	Rs.
<i>Tagai</i> advances	2.98 lakhs.
Relief works	16.38
Gratuitous relief and dōles	2.72 „
Improvement of water supply	0.4 „
Fodder supply	0.27 „

Madras.—Bellary, Anantapur and Kurnool districts were affected by drought. Relief works and test works were opened in the affected villages and arrangements made for the supply of fodder from Government Depots and for the grant of loans for subsistence. Gratuitous relief was granted and

free grazing of cattle in *panchayat* forests was permitted. A number of districts, particularly Tinnevely, Chingleput, Nellore, Madras, South Arcot, North Arcot, Tanjore and Trichinopoly were affected by floods in November, 1937. Financial assistance was given to those who had been rendered homeless.

Bengal.—During the monsoon of 1937, parts of the districts of Bakarganj, Chittagong and Noakhali suffered from flood or cyclone. To relieve the distress caused, agricultural loans amounting to Rs. 2·46 lakhs were given and gratuitous relief provided to the extent of Rs. 12,000.

United Provinces.—The kharif crop was damaged in some places by floods and in others by insufficient rains. Relief was given in the form of remission of land revenue to the extent of Rs. 9½ lakhs and the grant of *taccavi* loans amounting to Rs. 29½ lakhs.

Punjab.—Special and general remissions on account of land revenue, water rates, rent and *malikana* to the extent of about Rs. 34 lakhs were given on account of the extensive damage caused by hailstorms and gram blight in various districts of the province. Cash relief to the extent of Rs. 1·15 lakhs from the provincial famine relief fund was given in the districts of Multan, Montgomery, Lyallpur, Muzahiargarh, Dera Ghazi Khan and Ludhiana where extensive damage was caused by hailstorms. Concession rates were allowed for carriage of fodder into Hissar and certain other districts, where fodder shortage prevailed.

Bihar.—*Bhadai* and paddy crops were damaged in certain districts owing to unfavourable weather conditions, floods and excessive rain late in the season. A sum of Rs. 1·12 lakhs was advanced as *taccavi* loans in the areas affected by floods or hailstorm, where free distribution of rabi seeds worth Rs. 8,500 was also made. In addition a sum of Rs. 19,200 was spent on gratuitous relief. Arrangements were made for the supply of fodder for cattle where it was needed.

Orissa.—Heavy floods occurred in Sambalpur, Cuttack and Puri districts. Crops were damaged and a number of houses were washed away. Immediate relief was given by the Government. A sum of Rs. 35,000 was granted from the Indian People's Famine Trust Fund for alleviating distress.

Assam.—Several parts of the Assam and Surma valleys were affected by floods and in some places crops were heavily damaged. Seeds of various crops were distributed in the affected areas.

Delhi.—*Kharif* crops were severely damaged owing to the failure of the monsoon. In the *barani* circles, there was considerable shortage of fodder. The situation was met by the distribution of *taccavi* for fodder and seed amounting to Rs. 43,200 and the suspension of Rs. 59,000 out of the *kharif* land revenue kist.

SECTION II.

HISTORY OF THE CHIEF DISEASES.

Introduction.

12. The continued inaccuracy of registration in respect of total numbers of deaths and of their causes robs Indian vital statistics of much of their value for detailed public health studies. Existing registration agencies in rural areas make it impracticable to carry out classification of the causes of death except in a few large groups and, apart from such diseases, as cholera, smallpox and plague with which the people are familiar, other deaths are ordinarily recorded as "fevers", "respiratory diseases" and "other causes". So much is this the case, that nearly 93 per cent. of the six million and odd deaths registered during 1937 were placed into these three groups.

The question of improving the registration and compilation of vital statistics has already been discussed at some length in the first section of this report, but the necessity for additional and more accurate information in respect of these large omnibus groups cannot be stressed too frequently. The matter is mentioned here only because it again forces itself into prominence in connection with the study of India's chief diseases.

Table A in Appendix II gives the numbers of deaths and the rates *per mille* of population for the chief diseases in British India and in the various provinces during 1937. In spite of their inaccuracy, these figures indicate that a large proportion of the mortality is preventable. 'Fevers' alone account for over 3,570,000 deaths, or 58 per cent. of the total during the year. This large figure almost certainly includes over a million due to malaria and large unknown numbers due to typhoid fever and tuberculosis which are all largely preventable diseases. In addition, cholera, smallpox, plague, dysentery, diarrhoea and respiratory diseases were together responsible for about 15 per cent. of the total deaths and there is little doubt that much of the mortality from these diseases could also be prevented.

The problem of prevention, however, is not purely medical, because social, economic and administrative questions are all involved in its solution. Whilst knowledge of the causative factors of each disease undoubtedly forms the foundation of sound preventive work, it must be recognised that disease as a community problem is largely dependent on social organisation and on the habits of the people. Improvements in environmental hygiene, the attainment of a higher level of efficiency in the health administration of local bodies, more detailed supervision of the health functions of local authorities by provincial Governments through their expert advisers and, above all, the need for health education of the people have been repeatedly stressed in previous reports, but these points are again emphasised, because the vast amount of needless suffering and sickness, evidenced by the vital statistics of the country, demands increased effort from all concerned.

In this connection, attention is drawn to the fact that, even under existing Local-Self Government Acts, provincial Governments possess considerable powers of supervision over their local authorities. In no direction are supervision of the public health activities of local bodies and coordination of their efforts more urgently required as in the control of infectious diseases. As an illustration, the action taken by the Madras Government in respect of cholera deserves mention. In March, 1936, that Government issued "Cholera Rules" embodying the action to be taken for combating this disease in local board areas. These are statutory rules framed under sub-section (1) of section

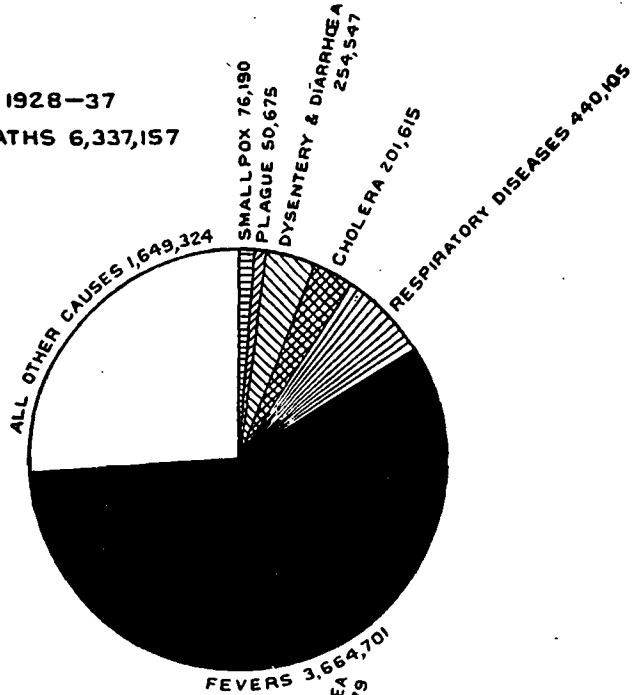
No 4

BRITISH INDIA

COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES

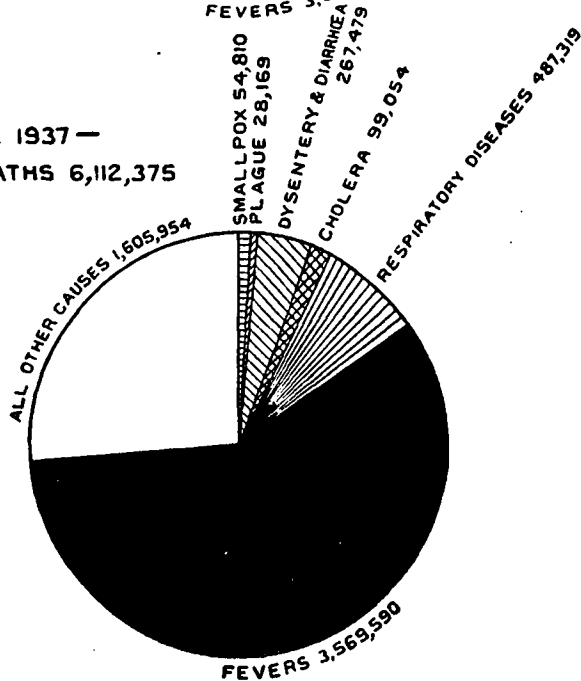
MEAN 1928-37

TOTAL DEATHS 6,337,157



YEAR 1937 -

TOTAL DEATHS 6,112,375



199 of the Madras Local Boards Act, 1920, and have therefore greater force than purely executive orders of Government. The rules make it obligatory on the President of the District Board to carry out the recommendations of the district health officer for combating cholera when it breaks out, and the Director of Public Health is the final authority whenever difference of opinion arises between the President of the District Board and the district health officer. The latter officer has been given control over any additional staffs appointed by the Board and provision has been made for equipping him and his subordinates with all necessary medicines and appliances. The rules also provide for close cooperation between the medical and public health departments and the importance of this provision cannot be over-emphasised, because preventive and curative work should dovetail into each other if any campaign against cholera is to prove effective. Similar action might with equal advantage be taken in respect of other diseases.

Whilst the desirability of each province having a comprehensive Public Health Act has been repeatedly stressed in these reports, utilisation of the existing powers of provincial Governments would go a considerable distance towards saving much of the preventable morbidity and mortality which at present occurs in every part of this country.

Cholera.

13. If every Indian village were provided with a protected water supply and were to practise a sanitary method for the disposal of refuse and nightsoil there would undoubtedly follow a marked and permanent reduction in the incidence of bowel diseases, such as cholera, dysentery, diarrhoea and typhoid fever, whilst guineaworm infection, which causes a large amount of suffering and incapacitation would also be suppressed. Under present circumstances, costly installations for the purification of water and the provision of piped supplies are no doubt impracticable, except for a number of the larger urban centres, but there is abundant scope for improving existing supplies by relatively less expensive methods. The possibilities of obtaining water from tube-wells both for human consumption and for agricultural purposes have within recent years been given considerable attention in certain provinces and, as this type of well ordinarily provides a safe supply, the question of its wider adoption deserves examination.

Another important subject in the same connection is the protection of water supplies in the many centres where religious festivals and fairs are held. Although a number of the larger festival centres now have satisfactory supplies, it must never be forgotten that the smaller festivals may be equally dangerous in respect of diseases like cholera. The Director of Public Health, Madras, in his report for 1936, drew pointed attention to two cases of this kind, and other similar occurrences are only too well known. In addition, the main pilgrim routes both rail and road require similar facilities, because infection carried by returning pilgrims to villages lying along these routes, frequently results in a widespread dissemination of infection. The recent widespread dissemination of cholera through the United Provinces and the neighbouring provinces of Delhi, Punjab, Bihar and the Central Provinces, following the Hardwar festival in April, 1938, demonstrates that even elaborate precautionary measures at the festival centre itself are not sufficient to ward off the danger. The only certain preventive measure lies in protected water supplies and efficient systems of nightsoil disposal for both towns and villages, and it is towards this goal that the energies of provincial Governments and local authorities should be constantly directed.

Perhaps no epidemic disease in this country presents such variability in incidence from year to year as does cholera. Quinquennial averages for cholera mortality in British India including Burma are given below for the period 1877 to 1936 and, although the quinquennial grouping has smoothed the annual variations to some extent, it is clear that the fluctuations are still considerable.

TABLE II (i).

Periods.	Annual average.
1877-81	293,697
1882-86	291,423
1887-91	406,004
1892-96	448,718
1897-01	388,403
1902-06	372,426
1907-11	404,703
1912-16	335,167
1917-21	397,296
1922-26	148,437
1927-31	301,936
1932-36	142,425
1937	{ 99,054*
	{ 102,545†

Individual years also show wide variations. Expressed as rates *per mille* of the population, cholera mortality has ranged between 3.7 *per mille* in 1900 and 0.2 *per mille* in 1932, during the sixty years for which figures are given. During the period, 1931-37, the incidence of cholera remained at a comparatively low level, the highest rate recorded during these years being 0.8 *per mille*.

In British India, deaths from cholera totalled 99,054 in 1937 as against 158,736 in 1936, a decrease in incidence of nearly 38 per cent. The death rate was 0.4 *per mille* in 1937 as compared with 0.6 *per mille* in 1936. During the year under review, Delhi and Ajmer-Merwara recorded no cholera deaths; all other provinces, except Bihar and Assam, showed lower rates than those of the previous year. Bengal, Orissa and C. P. recorded the largest decreases, from 1.5 *per mille* to 0.6 *per mille* in Bengal; from 1.1 *per mille* to 0.7 *per mille* in Orissa; and from 0.6 *per mille* to 0.1 in C. P. In Bihar, the cholera death rate rose from 0.2 *per mille* in 1936 to 0.4 in 1937 and in Assam from 0.5 *per mille* to 0.6 *per mille*.

The history of cholera epidemics during 1937 in the individual provinces may now be briefly discussed. In the N.-W. F. Province, two separate cholera outbreaks took place. In Saider Sharif Swat State (Malakand Agency) infection was brought by Hindu Sadhus travelling to a sacred place of pilgrimage called Ilum, and the epidemic lasted for over three weeks during which period a total of 202 cases with 100 deaths were reported. The second outbreak occurred in Kohat district during parts of September and October, when 56 cases and 24 deaths were recorded. On both occasions, large numbers of anti-cholera inoculations and other precautionary measures were carried out by a special medical staff.

In the Punjab, cholera was responsible for 184 cases and 105 deaths, giving a death rate of 0.004 *per mille* as against 0.07 during 1936 and 0.09 the decennial mean. Of the 184 cases, it is reported that 49 were examined with a view to determine the type of the infecting organism, but only in four cases did specific tests provide evidence of the presence of the true cholera vibrio-

* For British India excluding Burma.

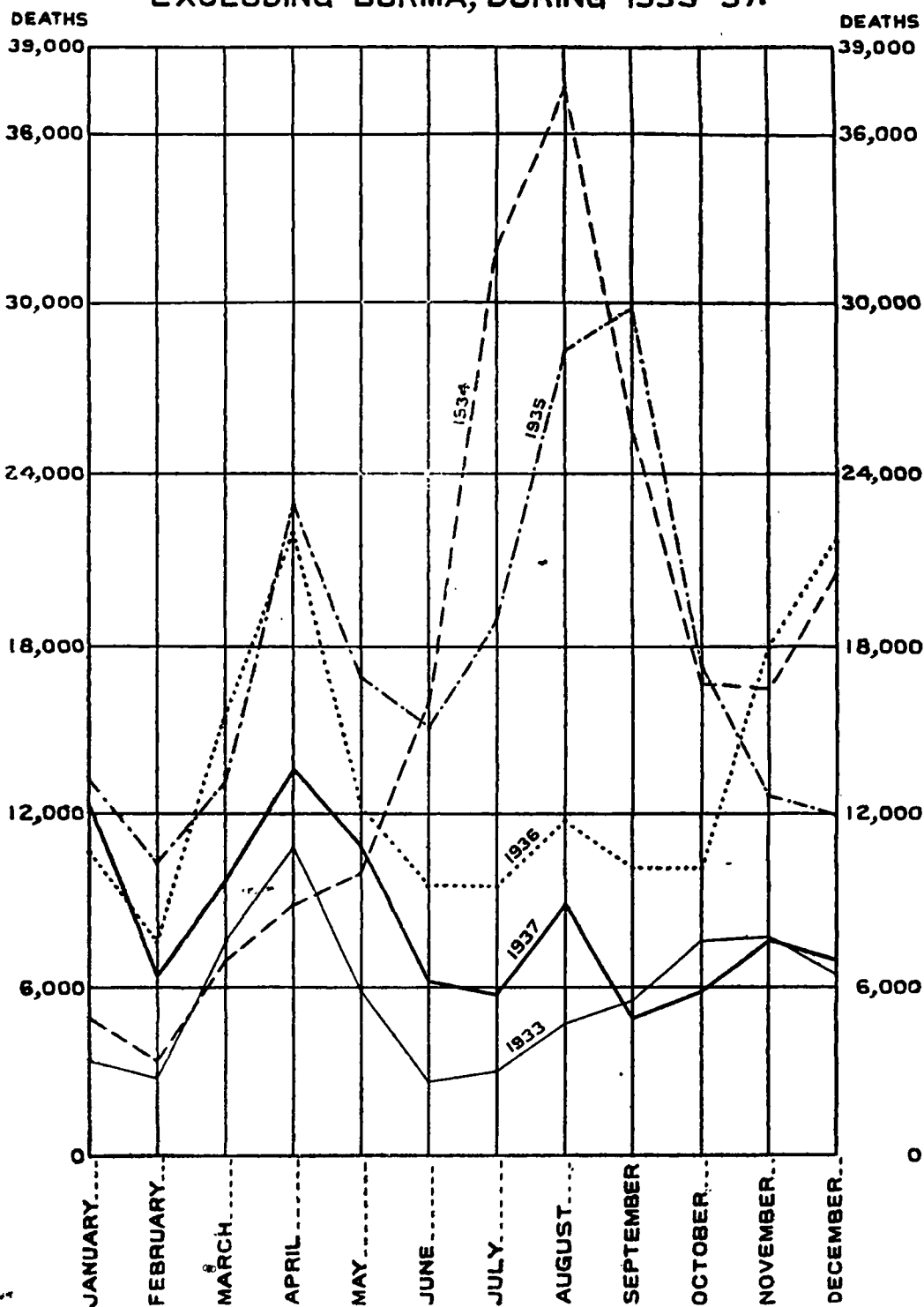
† Includes deaths for Burma.

№ 1

DISTRIBUTION OF CHOLERA MORTALITY DURING 1937



CHOLERA DEATHS BY MONTHS IN BRITISH INDIA, EXCLUDING BURMA, DURING 1933-37.



Generally speaking, the disease appeared as localised outbreaks, on a number of occasions the infection being imported from outside the province, particularly from Hardwar. Most of the cases occurred between July and September, the maximum incidence being recorded in August.

The cholera situation in the United Provinces was much the same as in the previous year, the number of deaths being 6,341 as compared with 6,793 in 1936. These figures gave death rates of 0·13 *per mille* and 0·14 *per mille* as compared with the quinquennial average of 0·25 *per mille*. The maximum mortality (1,518) occurred in November and the minimum (10) in January. Of the provincial total, 5,313 deaths were recorded in rural areas, giving a rate of 0·12 *per mille*. In a few urban areas, the death rates were very high, e.g., Jasrana (20·1 *per mille*) and Purdilnagar (15·7 *per mille*).

In Bihar the death rate from cholera increased from 0·2 *per mille* in 1936 to 0·4 *per mille* in 1937. The districts of Bhagalpur and Monghyr recorded the highest death rates of 1·2 and 1·0 *per mille* respectively. The Director of Public Health stated that a study of cholera figures during the period 1922 to 1937 demonstrated certain interesting epidemiological features for the disease. In the districts of South Bihar cholera starts late in the summer and continues till the winter sets in. On the other hand, in North Bihar, the disease breaks out early in summer and disappears towards the end of the monsoon season. Cholera exhibits a periodicity of five to six years in the province and epidemics of highest intensity occur in North and South Bihar in different but consecutive years. During the last decennium the maximum intensity of epidemics has tended to be definitely lower than in the previous years and the Director of Public Health attributes it to a "better understanding among the masses of the real nature of the disease and timely demand and quicker provision of preventive measures."

Orissa, like Bengal, is well known for frequent and serious outbreaks, but during 1937 the cholera mortality figure fell from 7,977 in 1936 to 5,076. The districts of Cuttack (3,103) and Balasore (1,499) recorded the largest numbers of deaths and the disease was prevalent in the districts of Cuttack, Balasore and Puri throughout the year. Its maximum intensity was reached in the district of Cuttack from January to April and in Balasore from July to September. As regards the question of introducing compulsory inoculation as a preventive measure against cholera, the Director of Public Health remarks that "anticholera inoculation has become a popular preventive measure. People now offer themselves of their own accord for inoculation at the approach of the cholera season." From the point of view of prevention, immunity should be conferred prior to the cholera season and, if voluntary and other efforts could promote mass inoculation on an effective scale, particularly in the commonly affected areas, the resulting demonstration of protection would have far-reaching effects, even apart from the control of cholera. If once rural populations could be convinced that the work of Public Health Departments is for the improvement of their health, their response to other activities of health staffs in respect of the control of other diseases, of improvement of environmental hygiene and so on, would similarly be obtained.

In Bengal the number of deaths from cholera decreased from 76,100 in 1936 to 32,710 in 1937, which represents a decrease of 53·3 per cent. In comparison with the average for the previous quinquennium the fall was 30 per cent. During the year under review 590 circles of registration reported infection as compared with 646 during the previous year, out of a total of 712 circles. In this province the cholera curve shows an upward trend from November, with a slight fall in February, and a continued rise in March till the

peak is reached in April. The monsoon months show the smallest incidence of the disease. During 1937 the seasonal distribution of cholera was the same but the rates of mortality were appreciably lower during every month in comparison with 1936. The Director of Public Health draws attention to two factors which may, in course of time, reduce the prevalence of cholera, *viz.*, the increasing willingness of the people to submit themselves to protective vaccination and the gradual extension of protected water supplies in the rural areas through the installation of tube wells. While it may not be justifiable to attribute the large fall in cholera mortality during the present year to these two causes alone, extension of the tube well system and a wider practice of preventive inoculation are bound to change the cholera history of Bengal and the invidious distinction that the province has earned as an endemic home for the disease may disappear.

In the Central Provinces, cholera mortality decreased markedly from 10,691 in 1936 to 1,107 in 1937. The largest number of deaths (188) was recorded in October and the lowest (three) in March. The disease broke out in March in the districts of Raipur and Betul and then spread over a large part of the province. Although the prevalence of cholera was not extensive, the infection was reported to be of a severe type, the case mortality rate for the province being 46.0 per cent. Urban areas suffered more than rural areas, the respective death rates being 0.09 *per mille* and 0.07 *per mille*.

In Bombay Presidency, cholera deaths numbered 10,992 during the year under review, as compared with 11,304 during 1936, these two figures also compare closely with the totals recorded each year since 1934. The Director of Public Health reports that "the peculiar feature which cholera is assuming is the absence of violent fluctuations which are replaced by an almost uniform toll of deaths year after year. The seasonal periodicity is still apparent, but the disease continues in some tracts almost throughout the year in contrast to the waves during certain months and complete absence afterwards". Attention has previously been drawn to this apparent establishment of cholera in endemic form in Bombay Presidency and it seems desirable that some investigation should be made into the change of incidence of the disease in this province. The epidemiology of cholera has been the subject of intensive study during the past few years, but further work is required in view of the importance of the disease not only to India but to other countries.

The incidence of the disease reached its height in August (3,533 deaths) and was at its minimum in March. The districts of West Khandesh, Nasik, Satara, East Khandesh, Ahmednagar and Sholapur were all severely affected. In view of the large volume of traffic that converges on Bombay City from different parts of the province and from other parts of India, it is interesting to note that the city reported only four deaths from cholera in 1937 and five in 1936.

In Madras Presidency, cholera deaths decreased from 34,117 in 1936 to 23,307 in 1937, a decrease of 32 per cent. The mortality was highest during the first and lowest during the last quarter of the year. The winter epidemic at the close of 1936 continued with varying severity in the central and southern districts of the province during the first quarter of 1937, a number of different festivals being responsible for the dissemination of infection during this period. Infection subsided for the most part in the southern districts by the end of the third quarter. The winter epidemic of 1937 in the Cauvery delta was comparatively mild, except for certain areas in South Arcot district, which experienced a severe outbreak in December. In the meantime cholera was

imported from outside into Bellary district during the second quarter and in July into Kistna district, also from an outside source. These outbreaks spread into six neighbouring districts and fairly extensive areas were affected.

The public health organisation in Madras Presidency is a provincial service covering the whole of the rural areas, whilst in municipalities the medical officer of health is also a servant of the provincial Government. This arrangement has the advantage that the Director of Public Health can, in order to combat epidemics or to organise sanitary control of festival centres, concentrate his public health staffs where they are urgently required and can also ensure that an adequate measure of coordination is maintained between the staffs of neighbouring local authorities.

The number of deaths from cholera in Assam rose from 3,816 in 1936 to 5,440 in 1937, the corresponding rates being 0.5 *per mille* and 0.7 *per mille* as against the decennial average of 0.8 *per mille*. Of the total, 5,412 deaths were recorded in rural areas and only 28 occurred in towns. The district of Sylhet suffered worst, the death rate being 1.6 *per mille*. The height of the epidemic was reached in April and May. Five permanent and two temporary epidemic units, each consisting of three sub-assistant surgeons, worked in the cholera infected areas and carried out anticholera inoculations and administered bacteriophage.

The cholera researches carried out in India during the past few years, under the auspices of the Indian Research Fund Association, were described in last year's report in a note prepared by the Chairman of its Cholera Advisory Committee. The following brief account of the researches made during 1937 shows that this disease is still the subject of active investigation.

Central Research Institute, Kasauli.—The investigations made during the year under review were carried out in collaboration with enquiries established in other parts of India which were able to supply useful field material for study and included among others: (i) the serological characters of vibrios other than those of 'O' group I; (ii) the incidence of vibrios in natural water sources and their characters; (iii) selective methods of culture of *V. cholerae*; and (iv) the nutritive requirements of *V. cholerae* for multiplication and survival.

The results of the investigations into the serological characters of vibrios, other than those of 'O' group I, established the fact that the vibrios, other than typical *V. cholerae*, isolated from cases of clinical cholera were of very numerous different serological and biochemical types, many of those isolated from cases being similar to those isolated from water and other sources under conditions where a cholera origin was extremely unlikely. No serological type other than that of 'O' group I was consistently isolated from cholera cases. Out of 828 strains isolated in Calcutta during the epidemic year, 86.5 per cent. were typical *V. cholerae* and the remaining 13.5 per cent. belonged to at least 20 different serological groups, a few remaining unclassified. These findings are considered to support the conclusion that in India only typical *V. cholerae* of the serological type of 'O' group I is responsible for the epidemic disease.

Findings regarding the incidence and characters of vibrios isolated from natural water sources indicated the probable water origin of vibrios of types other than 'O' group I which are to be found in the stools of healthy persons in India or even in the stools of cholera cases. This is supported by the fact that strains isolated from water in a cholera-free area agglutinate with sera prepared against inagglutinable case strains. The presence of a considerable proportion of 'H' agglutinators amongst the water strains add further importance to the use of the test of 'O' agglutination for diagnosis.

Out of a series of 16 strains, isolated from non-cholera patients, sent from Java which was a cholera free locality, 58 per cent. were found to be 'H' agglutinators, whilst five strains agglutinated with special test sera prepared against strains isolated from cases of clinical cholera in Calcutta.

Selective methods of culture for the isolation of *V. cholerae* appear to be essential for a study of the epidemiology of the disease. With the ordinary method of enrichment in peptone water, followed by plating on a selective medium such as Aronson's, when true *V. cholerae* and other vibrio types are together present, the latter quickly outgrow the true

cholera organism and attempts to study the conditions of survival of *V. cholerae* in carriers or external sources require the development of a technique which provides a high chance of isolation for this organism. Various methods were tried and success was obtained by the use of a modification of Wilson and Blair's enrichment medium containing bismuth sulphide and with certain other changes, including the substitution of mannose for mannite in the original medium.

An extensive study of the nutritive requirements of *V. cholerae* for multiplication and survival was carried out. It was ascertained that a certain minimum pabulum of organic and inorganic matter was necessary. No qualitative differences between the action of organic and inorganic constituents were noted, with the possible exception that sodium sulphide appeared to have a small but definite specific favourable effect on multiplication. It was found possible from a chemical examination of a water to forecast whether multiplication and survival would occur in any sample. The majority of tank waters in Calcutta showed figures coming within the ranges of inorganic and organic matter content found experimentally to be favourable, and sterilized samples of such waters inoculated with *V. cholerae* gave the growth and survival of the vibrios which was expected.

All-India Institute of Hygiene and Public Health, Calcutta.—Field epidemiological studies, laboratory investigations into the chemical structure of *V. cholerae*, changes undergone by vibrios through passage in flies, and statistical studies of cholera mortality figures in Bengal continued during the year.

The field studies appeared to suggest that case-to-case infection played a more important part in the spread of cholera than infection through environmental sources because the available evidence indicated that the range of infection from cases was confined to immediate contacts. As regards the general population, the carrier rate was dependent more on the season than on the incidence of cases.

Investigations on chemical structure showed that, beginning with a culture descended from a single cell and having certain biochemical, cultural and serological characteristics and with a particular chemical structure, it was possible to produce a new strain which differed from the parent in respect of all these characters. The officer-in-charge of this inquiry reported that, "although almost nothing is known about the internal arrangements of the vibrios, it may perhaps be permissible to suggest that each of them possesses the enzymic equipment capable of synthesizing the various proteins and polysaccharides which are found in the whole group; that during the course of synthesis and growth sometimes one and sometimes another of these constituents is formed; and that as a result of this shifting in the direction of synthesis a new type of organism is produced which gives rise to a strain different in character because it is different in chemical composition from the parent strain. Since in these experiments all the cells were descended from one cell, and yet were capable of giving rise to variants,—it is difficult to account for our observations on any other basis." In addition to these studies, work has been in progress on the three types of polysaccharides found in vibrios.

The statistical studies on cholera mortality figures have divided the south-western portion of Bengal into homogeneous cholera districts as a preliminary step towards a detailed study of the causes underlying variation in incidence of the disease.

A method of forecast of cholera has been evolved which, it is stated, gives fairly satisfactory results as tested over a period of years of previous cholera experience.

School of Tropical Medicine, Calcutta.—This enquiry was mainly concerned with the study (a) of vibrios isolated from cholera patients, natural waters and non-cholera individuals and (b) of the characteristics of recently isolated choleraphage. Isolation of vibrios was carried out in series by using bile salt medium and Aronson's medium prepared according to the method suggested by Col. J. Taylor. In regard to stools, although a larger number of colonies was obtained on Aronson's medium than on bile-salt agar, no difference was found in the proportions of positive findings. On the other hand, Aronson's medium was definitely superior to the other in respect of isolation of vibrios from natural waters. Work was also continued on the study of the recently isolated choleraphage types, particularly on the type described as 'L1' by Bruce White.

Pasteur Institute, Shillong.—This enquiry concentrated on (1) examination of water for vibrios; (2) examination of stools; (3) transformation experiments; and (4) bacteriophage inhibition by vibrio extracts.

№ 2
WORLD PLAGUE SITUATION IN 1937-38



- A. Active foci of human plague.
- B. Active foci of selvatic plague, with occasional human cases.
- C. Important foci of selvatic plague apparently quiescent at present.

*Note- Reproduced from the Weekly Epidemiological Record (R.H.634)
of the Health Section of the Secretariat of the League of Nations
for the week ending 20th. April 1938.*

C. Important foci of selvatic plague apparently quiescent at present.

Of the samples of water from Habiganj, 31 per cent. were found to contain vibrios. There was no evidence of transformation, unless it could be said that agglutinable vibrios had, in every case, changed to one or other of the inagglutinable types already present in the water. The results show that the agglutinable vibrio could be recovered for a period varying from 1.7 days. Extracts prepared by papain digestion of vibrios were found to be quite efficient. It was also found that lipid extracts had a general inhibitory effect on all phage types, and agglutinable could not be differentiated from inagglutinable vibrios.

King Institute, Guindy. - Cultural and serological examination of strains of *V. cholerae* isolated from different districts in Madras Presidency was continued. The year's observations have emphasised the distribution of Inaba and Ogawa types of vibrios in two distinct geographical zones, north and south. By the isolation of vibrios from natural water sources, it was found that practically all natural waters contained vibrios. None of the strains isolated belonged to 'O' sub-group I. In addition, the rôle of the house fly as a vector was studied. So far, it has been shown that the cholera vibrio can be recovered from the fly only up to 24 hours after ingestion, this being due to the fact that extracts of the fly's intestine have a lethal effect on the cholera vibrio. This work is being further developed.

Plague.

14. The world plague situation during 1937-38, was presented in a map in the Weekly Epidemiological Record of the Health Section of the League of Nations for the week ending 20th April 1938.* From the accompanying reproduction of that map, it will be seen that, in respect of active foci of human plague, India continues to occupy a prominent place, although certain countries in South America and Africa as well as Burma and China also record plague infected areas. The lighter shading, which represents the presence of selvatic plague with occasional human cases, is confined to California, South and South-West Africa and Sinkiang on the western border of China. The historically important areas of selvatic plague in Mongolia, Manchuria and the south-eastern parts of Russia are apparently now quiescent. However, the fact that selvatic plague is present in an active form in certain parts of the world points to the possibility of renewed dissemination of infection provided suitable conditions arise. The danger of extension of plague infection was stressed in a resolution of the League of Nations Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene held in Java in August, 1937, which stated :—" Since the tendency of pandemic plague to diminish in some parts of the world is offset by the possibility of its development elsewhere, and since, moreover, there is a growing danger of the dissemination of plague through the agency of modern communications, which are rapidly increasing throughout the world, the rural plague problem remains of great importance. It is therefore incumbent upon the Governments concerned to maintain the strictest vigilance by keeping their health services and permanent anti-plague organisations adequately provided with the necessary material and personnel ".

As regards India, the suggestion in respect of variability of prevalence is amply justified. Although the average yearly incidence of the disease has definitely decreased within recent years, and in 1936 the lowest plague mortality since 1898 was recorded, during the year under review the total plague deaths increased to nearly three times those recorded during the previous year. Moreover, in respect of its incidence in different provinces, the Punjab and the United Provinces provide striking contrasts. In the former, whilst plague has been a serious health problem since its introduction in 1898, during 1937 indigenous cases were entirely absent and only four imported cases were recorded. In the latter province, on the other hand, plague deaths were nearly four times those of 1936. Further, certain endemic foci continue to exist in the affected

provinces and epidemic outbreaks commence almost invariably in such areas as the cold season approaches. These facts emphasise the importance of untiring vigilance on the part of health departments.

The problem of plague prevention in India is complicated by the fact that the cost of rat-proofing existing houses or of constructing new houses on the same principle is prohibitive, unless cheap designs can be evolved. In this connection, it is interesting to note that the Rural Hygiene Conference drew attention to the fact that the "Netherlands Indies Government has set an excellent example with its improved bamboo dwellings, and (that) similar principles may be applied in communities where timber, mud, straw and the like are utilised." Plague broke out in Java in 1911* and in the district of Malang with approximately 7,40,000 inhabitants, plague deaths totalled 22,000 during 1911-15. As an anti-plague measure improvement of houses has been carried out unremittingly in that district since the first outbreak of the disease and a total of 1,49,000 dwellings were dealt with during that period. "Since 1916 except for single imported cases, no plague has occurred".

This remarkable achievement provides an important lesson in respect of the plague situation in India. Out of a total of 28,169 deaths from plague in British India during 1937, nearly 92 per cent. occurred in rural areas. The economical methods of rat-proofing practised so successfully in the Dutch East Indies merit earnest study by all provincial health authorities in this country. As regards towns and cities, where large warehouses are used for the storage of food grains, etc., attractive to rats, more substantial methods of rat-proof construction are necessary but the additional expenditure involved would no doubt be followed by rapid disappearance of infection in areas which now act as active centres for dissemination of the disease.

Deaths from plague by months are shown in table F of appendix II for British India and the provinces and for Indian States and Agencies. Rates *per mille* for rural and urban areas are given in table B of the same appendix.

In British India, plague deaths increased from 10,738 in 1936 to 28,169 in 1937. In the United Provinces alone no less than 24,036 deaths were recorded; or 85 per cent. of the total for British India; in other areas the figures were much smaller, e.g., Bihar 1,470, Madras Presidency 1,127, Central Provinces 1,002 and Bombay Presidency 506. The figures for Sind (16), Coorg (8) and Punjab (4) were insignificant as regards numbers, but were ominous indications that infection continued to smoulder in these areas.

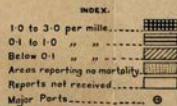
In those provinces which recorded a high plague incidence, the rural was higher than the urban rate in the United Provinces, Central Provinces and in Bombay Presidency; in Madras, the urban rate was higher and in Bihar the two rates were identical.

As regards seasonal incidence, the minimum figure for British India was reached in October and the heaviest mortality in March. A comparison of the monthly figures for the different provinces shows no striking departure from the curve of incidence for British India, except in Madras where the maximum occurred in November and December and the minimum in June.

As already stated, the heaviest incidence occurred in the United Provinces, total deaths numbering 24,036, as compared with 7,290 during 1936. The respective death rates for the two years were 0.50 and 0.15 *per mille* as against a quinquennial mean of 0.45 *per mille*. The highest mortality (7,139) occurred in March and the lowest (102) in October. Of the total, 22,155 deaths occurred

*Editorial, "Plague, a brief consideration of its prevalence and control in the twentieth century", the Journal of Tropical Medicine and Hygiene, 16th May, 1938.

No 3
 DISTRIBUTION OF PLAGUE MORTALITY DURING 1937

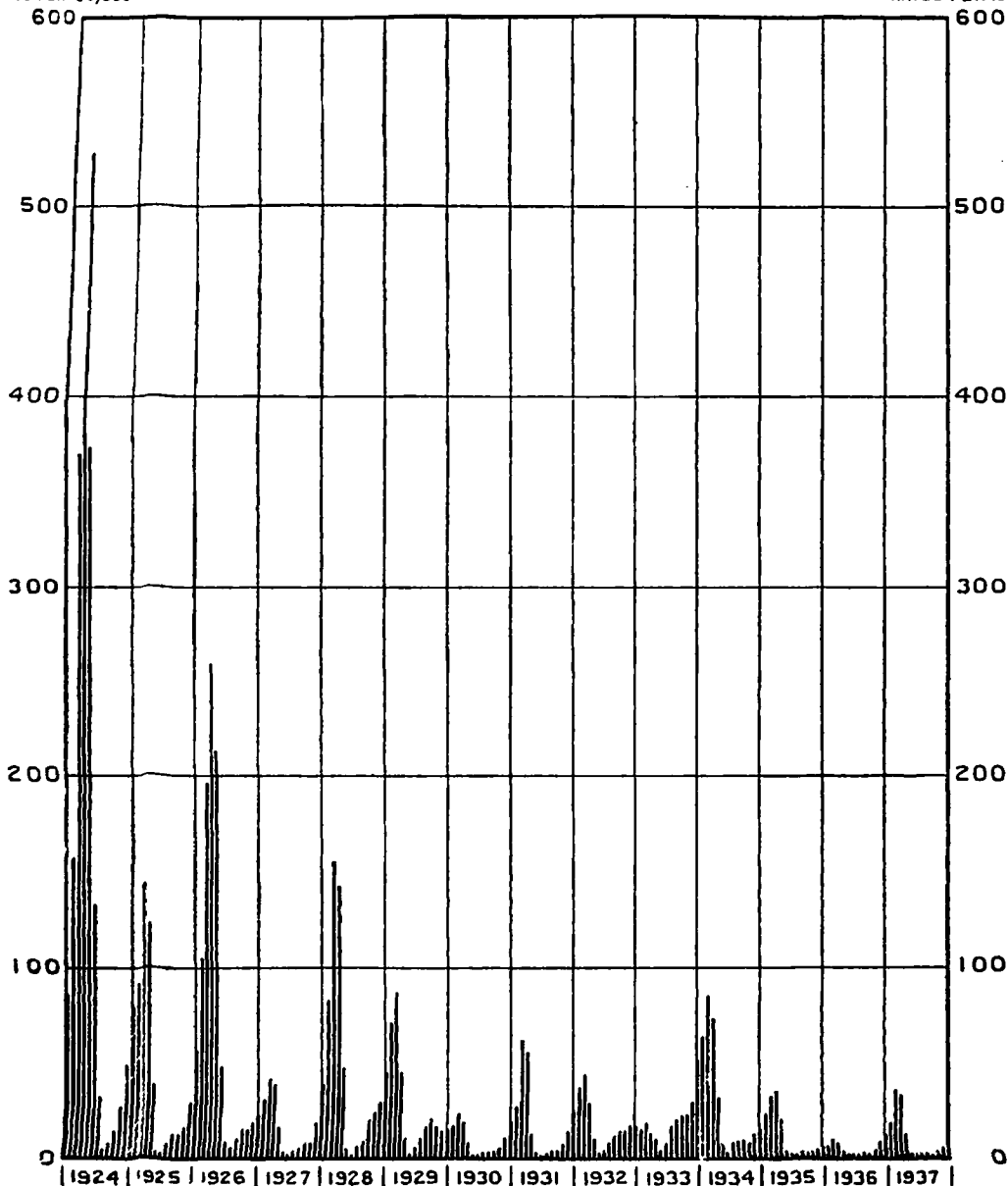


No. 6

MONTHLY PLAGUE MORTALITY RATES PER 100,000 OF ESTIMATED POPULATION IN BRITISH INDIA (EXCLUDING BURMA) DURING 1924-37

RATES PER 100,000

RATES PER 100,000



in rural areas, the rural and urban death rates being 0·5 and 0·3 *per mille*. The worst affected rural areas were in the districts of Azamgarh (2·9), Gorakhpur (2·4), Meerut (2·1) and Muzaffarnagar (1·7), but no deaths were reported from the rural areas of 31 districts. In urban areas, some of the smaller towns recorded very high death rates, e.g., Atraulia 44·8 *per mille*, Rabupura 23·0 *per mille*, Pahasu 21·4 *per mille* and Nizamabad 20·9 *per mille*. In 40 towns the number of plague deaths did not exceed 10, whilst 370 towns were free from the disease.

As regards preventive measures a total of 311,558 inoculations were carried out by medical officers attached to travelling dispensaries, by district health staffs and by other agencies. It was reported that vaccination against plague was becoming popular and that the evacuation of infected houses as an anti-plague measure evoked much less active hostility than previously. Over 2,287,000 rats were reported to have been caught and killed in the infected areas.

In Bihar deaths from plague numbered 1,470, which gives a death rate of 0·04 *per mille*. The Director of Public Health reported that, although the incidence of plague had greatly decreased within recent years, certain foci of infection continued to exist in the districts of Champaran, Saran, Muzaffarpur, Darbhanga and North Monghyr, and in these plague broke out almost every year with the approach of the winter, reached its maximum incidence in February and March and disappeared with the advance of summer. In 1937, the district of Saran alone recorded 1,098 deaths which gives a death rate of 0·4 *per mille*; other districts recording a high incidence were Muzaffarpur (0·09) and Champaran (0·02).

In Madras Presidency, plague deaths increased from 615 in 1936 to 1,127 in 1937. The mortality was at its minimum during the second and at its maximum during the fourth quarter. The Nilgiris district, which had remained free from plague for fifteen years, suffered from an outbreak, infection being introduced to Ootacamund through merchandise brought from Mysore State and later spreading to Coonoor and a number of villages in the same district. A severe outbreak also took place in Cumbum Valley, where 31 villages were affected. Hosur taluk in Salem district, which is an endemic area, also experienced a fairly wide-spread epidemic, and a small localised outbreak took place in Chittoor district, infection being introduced again from the Mysore State. The previous year's infection continued during the first quarter of 1937 in the districts of Bellary and Anantapur.

It has been reported that fumigation with cyanogas proved an effective measure of control and that in view of the encouraging results achieved, proposals have been made for the extension of this method to other areas.

In the Central Provinces, plague deaths numbered 1,002 in 1937 as compared with 835 in 1936, the corresponding death rates being 0·07 *per mille* and 0·05 *per mille*. Only seven districts were affected, Hoshangabad (663), Jubbulpore (139), Chhindwara (115), Nagpur (36), Saugor (26), Mandla (16) and Betul (7). It was reported that the total recorded attacks numbered 8,586, so that the case mortality rate in the province was only 11·7 per cent. In this connection the Director of Public Health has drawn attention to the fact that, within recent years, the fatality rate of plague has considerably decreased and that "reports from medical officers in charge of travelling dispensaries indicate that the disease is often so mild that patients go about their work during the course of the attack." The Director has also remarked that the geographical distribution of the disease has apparently an association with the growing of certain varieties of crops. "It is remarkable that those districts of the Central Provinces which chiefly grow wheat, gram and 'bajra', and to a certain extent 'juar', are the most affected and the least affected or almost free are

those whose main produce is rice. Thus the districts of Raipur, Bilaspur, Drug and Balaghat in Chhattisgarh Division and the district of Chanda in Nagpur Division, which chiefly cultivate rice, have only had 104 deaths from plague during the last 15 years. Bhandara, which is also a district in Chhattisgarh Division, is rice growing in its eastern half and wheat growing towards its western half which lies next to Nagpur district. Its plague contribution is mainly from its western half. It is possible that the holding up of water over large tracts under rice cultivation is unfavourable to the lodgement of rats and that rice itself is not a very attractive diet for rats."

Whilst this relative absence of plague in rice-producing areas does not necessarily establish, by itself, a causal relationship, these observations, coupled with the reported unusual mildness of the prevailing type of infection, call for epidemiological investigation. This will, it is hoped, be undertaken in the near future, by the Public Health Department of the Central Provinces, in collaboration with the Haffkine Institute in Bombay.

The incidence of plague in Bombay Presidency has shown a remarkable fall during the past five years as may be seen from the following statement which gives the annual totals for plague deaths.

Bombay Presidency.

	Plague deaths.
1933	24,560
1934	13,307
1935	2,453
1936	578
1937	506

The figures for 1936 and 1937 are much the lowest recorded since the disease was first introduced into the Presidency in 1896. The disease was confined to the southern districts of the province and cases occurred in 31 registration circles, 77 villages being infected. Reported cases totalled 781 giving a fatality rate of 64·8 per cent.

Although during 1937 infection was slightly more widespread than that during 1936, its intensity was lower as measured by the lower mortality. It is stated that cyanide fumigation was extensively practised in endemic areas, Government having provided a sum of Rs. 11,250 for this purpose to supplement the resources of local bodies. A similar method was in use in the same areas during the previous year. The field experimental work in Cumbum Valley in Madras Presidency has demonstrated that cyanide fumigation of rat burrows on an extensive scale results in definite reduction of the rat population but the history of plague in the past, with its periods of pandemic prevalence followed by long periods of quiescence, necessitates caution. Further evidence will be required before it can be confidently stated that the recent decrease in plague incidence has been affected by the practice of preventive measures.

In the Punjab, 1937 is the first year since plague was introduced in 1898, in which no indigenous cases have been recorded. Absence of plague infection did not, however, cause any slackening of the customary antiplague measures and it was reported that over one million rats were caught and destroyed in those localities previously known to harbour infection.

Plague researches are mainly centred at the Haffkine Institute, Bombay. In last year's report, reference was made to the work on the production of an improved plague vaccine, on the preparation of a potent antiplague serum and on certain studies in the epidemiology of plague. Research on the plague vaccine was continued. In regard to the plague serum, a recent field experiment was carried through at Bettiah in Bihar; 124 patients were alternately given serum and control treatment and encouraging results were obtained, the mortality rates in the two groups being 27 per cent. and 65 per cent. respectively. Whilst further extended trials are desirable before any definite claim can be made as to the value of the serum, the results so far obtained justify some degree of optimism.

With respect to the epidemiology of plague, groups of rats were obtained from Simla, a hill station in the Punjab, and from Berhampur in Bengal, where no plague epidemic has been known to have occurred. Examination showed that over 30 per cent. of these rats were resistant to experimental infection. These results correspond with observations previously made on rats obtained from Dharamsala, another hill station in the Punjab which has also been free from plague during the present pandemic. It would seem that some degree of natural resistance exists in certain strains of the rat and that the immunity shown by that animal in plague infected areas may be due to selective elimination of susceptible strains during rat epizootics.

Mention was made in last year's report that the field rat, *Gunomys varius*, had been found to be highly susceptible to plague. In 1907, when plague was still active in Bombay, the Indian Plague Commission noted that this species of rat formed only one per cent. of the rat population, *Rattus rattus* and *Rattus norvegicus* constituting the bulk of the rat population. The two last varieties were found by the Plague Commission to be equally highly susceptible to experimental infection, about 45 per cent. succumbing to experimentally produced infection. A survey in 1937 by the Haffkine Institute, has shown that *Gunomys varius* now formed over 30 per cent. of the rat population in Bombay. At the same time, *R. rattus* and *R. norvegicus* have been shown to be highly resistant and that only 10 per cent. are susceptible, whilst the proportion of susceptibles among *G. varius* is as high as 70 per cent. Evidently the passage of time has produced variations in the proportions of susceptible rats and this may have a bearing on the mechanism of the spread of plague and the development of plague epidemics.

Investigations in the Cumbum valley were mainly on the lines of the field studies which were described in last year's report. It is stated that, during 1937, owing to shortage of funds, investigations were mainly directed towards the evaluation of the application of cyanide products in antiplague campaigns. It has been found that in endemic areas, unless fumigation is repeated once every three months, the rat population cannot be kept below the level necessary for the elimination of epizootic plague.

Cheap methods of rat-proofing were also under investigation. "With a view to avoid cracks in walls, sand and red earth are mixed in varying proportions and walls were built with such mixtures. Walls built with earth only cracked as soon as they were dry, while the tendency to crack became less and less as the proportion of sand was increased. The optimum for Cumbum Valley appears to be sand and earth in equal proportions, plastered over with ant-heap earth".

Smallpox.

15. Deaths from smallpox and the corresponding rates *per mille* of the population in British India (including Burma) are given below for quinquennial groups from 1880-1934 and for individual years from 1930 to 1937.

TABLE II (ii).

	Average number of deaths.	Mean rate <i>per mille</i> .
1880—84	154,933	0.8
1885—89	79,344	0.4
1890—94	81,447	0.4
1895—99	89,444	0.4
1900—04	88,264	0.4
1905—09	111,276	0.5
1910—14	74,790	0.3
1915—19	87,071	0.4
1920—24	56,415	0.2
1925—29	98,051	0.4
1930—34	68,516	0.3
1930	72,813	0.3
1931	37,272	0.1
1932	44,925	0.2
1933	103,641	0.4
1934	83,928	0.3
1935	90,703	0.3
1936	104,805	0.4
1937	{ 56,180† (54,810)*	{ 0.2 (0.2)*

A cursory examination of this statement shows that wide variations occur, not only in the figures for individual years but even in the quinquennial groups where a certain amount of smoothing has been introduced by the process of averaging. It is also possible to conclude that some reduction in the incidence of smallpox has occurred during recent years, even although the registration of deaths has improved in the same period. At the same time the annual variations continue to be large; for instance, the total recorded mortality during 1937 was only about 52 per cent. of that of the previous year.

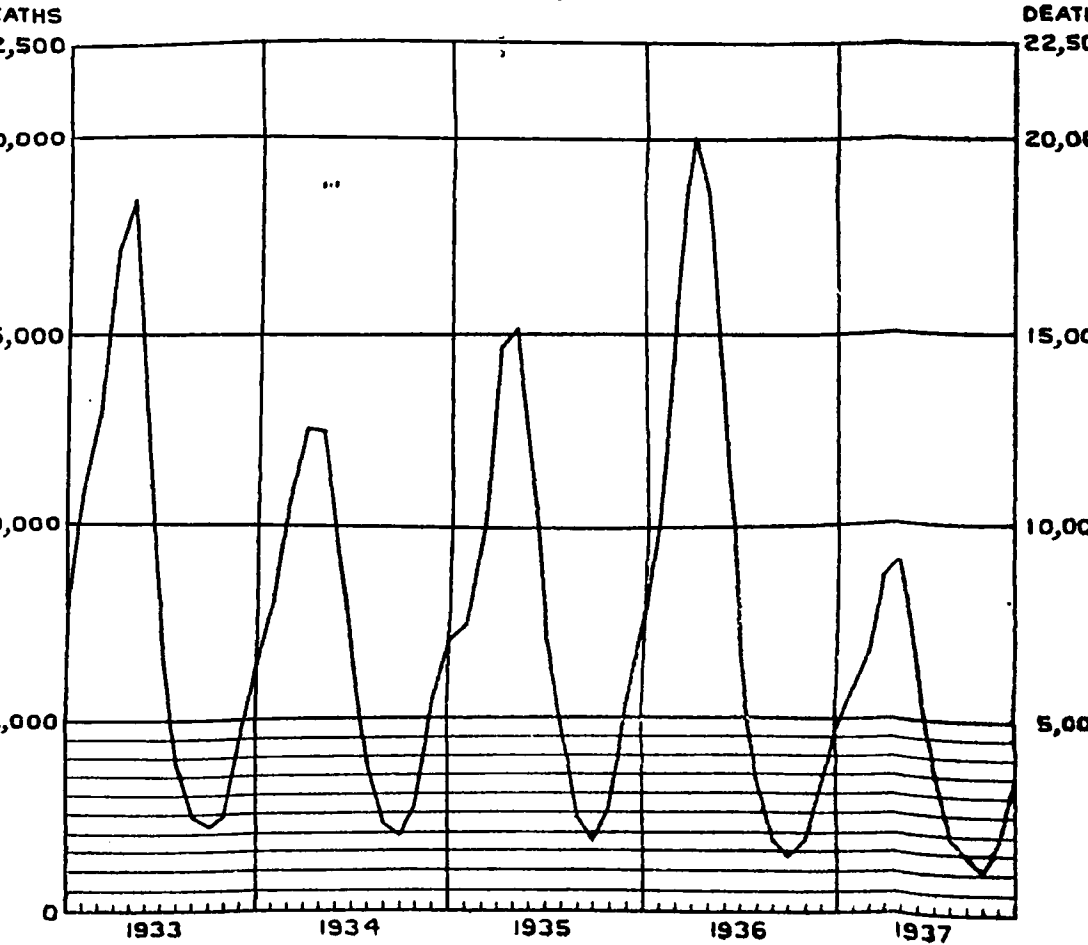
The disease, however, continues to take a heavy toll of life in this country in spite of the fact that vaccination against smallpox was introduced early in the nineteenth century. A further disquieting feature is that the percentages of smallpox deaths amongst infants and amongst children between one and ten years of age continue to be abnormally high in relation to the distribution of smallpox mortality throughout the community as a whole. Table G of appendix II includes the mortality figures at these two age periods expressed as percentages of the total smallpox deaths for British India and for the individual provinces. An unknown margin of error in these percentages is no doubt due to misstatements of age but this does not entirely account for some of the wide differences which exist between the figures reported from different provinces. For British India as a whole, 14.0 per cent. of the total smallpox mortality took place among infants under one year and 27.3 per cent. among children between one and ten years; the provincial figures, on the other hand, range between 6.1 and 37.9 per cent. in respect of the former group and between 10.7 and 62.6 per cent. in respect of the latter.

† Includes deaths for Burma.

* For British India excluding Burma.

No 7

SMALLPOX DEATHS BY MONTHS IN BRITISH INDIA,
EXCLUDING BURMA, DURING 1933-37.



On the assumption that persons of both sexes and of all ages are equally liable to smallpox, the following table has been prepared which sets out the expected numbers of deaths for these two age groups and includes for comparative purposes the actual numbers of smallpox deaths registered in the same groups in each province.

TABLE II (iii).
Deaths from Smallpox.

		1937.			
		Under one year.		Between one & ten years.	
		Actual.	Expected.	Actual.	Expected.
N.-W. F. Province		248	30	609	262
Punjab		1,480	149	1,821	1,017
Delhi		244	20	359	142
United Provinces		933	99	1,034	785
Bihar		458	182	798	1,981
Orissa		267	61	391	505
Bengal		2,414	928	7,452	7,161
Central Provinces		170	16	224	114
Bombay		440	55	804	447
Sind		128	22	401	204
Madras		677	68	713	599
Coorg		3	0	6	2
Assam		227	67	333	289
Ajmer-Merwara		Not avail- able.	20	Not avail- able.	143

From these figures, it is obvious that a selective incidence of smallpox mortality has occurred in both periods, but more particularly in the earlier age group. This abnormally high smallpox mortality among infants and children is all the more deplorable since we possess in vaccination a profoundly effective preventive weapon. The causes operating against successful community protection have been repeatedly discussed in these reports. In the first place vaccination is compulsory only in about 75 per cent. of the towns and in less than 50 per cent. of the rural areas in British India whilst even in compulsory areas enforcement of the law is not sufficiently practised. Secondly, defects in the registration of births, make it possible for large numbers of infants and children to escape vaccination. Further, primary vaccination itself being so defective, the enforcement of revaccination on an effective scale is even more difficult, because in few areas is revaccination compulsory. Lastly, the apathy of an uninformed public in regard to the necessity for protection by vaccination contributes in no small degree to the unsatisfactory position revealed by the figures for smallpox deaths already given in this paragraph. Whatever part a higher standard of environmental hygiene might be able to play in preventing the development of smallpox epidemics which are so commonly experienced in this country, there can be no doubt that, in the preventive fight against this disease, artificial immunity conferred by satisfactory vaccination must for long remain the most important weapon in the hands of the health officer and no effort should be spared in the attempt to obtain a well-protected community.

As a result of the encouraging work carried out within more recent years a large amount of unnecessary sickness, suffering and disablement has been prevented; with further efforts there is every hope that greater benefits will accrue.

As regards the incidence of smallpox during 1937 in the different provinces, the Punjab recorded a considerable increase during 1937 as compared with the previous year, 10,040 cases and 3,991 deaths being registered as against 6,158 cases and 2,613 deaths in 1936. The death rate was 0·17 *per mille* as against 0·11 for 1936 and 0·20 the quinquennial mean. The death rate in urban areas was 0·22 *per mille*; that in rural areas was 0·16 *per mille*. A total of 365 registration circles and 1,354 villages were infected, the corresponding figures for 1936 being 315 circles and 1,014 villages. The Director of Public Health has reported that this increase was not unexpected, because the incidence of smallpox had in the past shown a five yearly wave, the last severe epidemic having occurred in 1932-33.

In the United Provinces, smallpox mortality decreased considerably as compared with the previous year, the respective figures being 3,200 and 14,849. Of the total, over 75 per cent. took place in rural areas. The rural parts of Ghazipur, Gorakhpur and Jaunpur districts recorded the highest death rates, whilst of the towns, Mandawar, Jagner and Dankaur were worst affected.

In Bengal, smallpox mortality decreased from 46,267 in 1936 to 27,944 in 1937. The curve of smallpox mortality begins to rise in this province from November, reaches its maximum in April and then slopes downwards till October which usually records the lowest figure. During 1937 the curve of incidence was the same though the recorded mortality figures were lower than those of 1936 for every month except January, which showed a slight increase. Among the districts Chittagong suffered the worst, with a death rate of 3·2 *per mille* and Jalpaiguri with a rate of 0·002 *per mille*, suffered the least. In urban areas 1,321 deaths from smallpox were recorded or 0·4 *per mille* of the population. Of the total urban deaths Calcutta was responsible for 30·5 per cent.

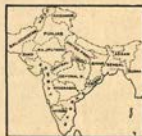
In the Central Provinces, a considerable reduction in smallpox mortality also took place, the figures for 1937 and 1936 being 460 and 2,318 respectively. Although the incidence of the disease was so much lower, its distribution was fairly extensive and deaths were reported from every district except Mandla, Bhandara, Balaghat and Akola. The urban death rate was 0·13 *per mille* and the rural rate 0·02 *per mille*. Case mortality rate was 16·9 per cent.

Deaths from smallpox decreased in Orissa from 3,789 in 1936 to 2,269 in 1937, the respective rates being 0·5 *per mille* and 0·3 *per mille*. As usual, rural areas suffered more than urban, the highest death rates being registered in the districts of Khondmals (1·6) and Cuttack (0·6). The highest urban rate (0·3) was recorded in Jaipur. The Director of Public Health reported that the beneficial effect of compulsory vaccination could be deduced from the lower incidence of smallpox mortality in those urban areas where vaccination was compulsory. On the other hand, vaccination was not compulsory in the rural areas except in the district of Puri and in the Ganjam plains. The hope was expressed that, with the passing of a new Local Self-Government Act for the province, vaccination and revaccination would be made compulsory.

In Bihar, smallpox mortality decreased from 22,863 in 1936 to 7,485 in 1937, a reduction of nearly 67 per cent. The Director of Public Health stated that a cyclical periodicity in the incidence of smallpox has been noticed, minima and maxima in the mortality curve having occurred in 1922 and 1926, 1929 and 1933. A gradual decline set in from 1934, the figure for 1937 being the lowest since the last peak in 1933. The Director added that, in spite of nearly 200,000 persons being vaccinated every year, a large number of the children born still escape primary vaccination and the fear is expressed that within a few years the proportion of the susceptible population may rise sufficiently high to lead to an epidemic of smallpox. Whilst this factor probably contributes to periodical rises in the incidence of the disease, the whole question deserves further

No 4

DISTRIBUTION OF SMALLPOX MORTALITY DURING 1937



INDEX.

Over 3.0 per mille	
0.5 to 2.0	
0.1 to 0.5	
Below 0.1	
Areas reporting no mortality	
Reports not received	
Major Ports	

investigation. It is suggested that the distribution of smallpox incidence in restricted areas should be investigated in relation to season, climatic factors and age, sex and immunity state of affected persons. "By limiting the enquiry to small areas, similar information could also be collected in respect of those who escape infection and the two sets of figures would not only provide additional proof of the effectiveness of the protection conferred by vaccination but would also give a sound foundation for the formulation of theories regarding the periodicity of the disease.

The highest district death rates were registered in Palamau (1.0), Manbhum (0.5) and Gaya (0.4); of the towns; Bettiah (2.03), Patna (1.9) and Chatra (1.7) recorded high death rates.

The number of deaths from smallpox in the N.-W.F. Province in 1937 was nearly twelve times that of 1936, the respective figures being 973 and 85. In addition, nine deaths were reported from the Agencies of Chitral and Malakand. The death rate was 0.39 as against 0.04 for the previous year.

In Assam, smallpox mortality rose from 963 in 1936 to 2,187 in 1937, the corresponding death rates being 0.12 *per mille* and 0.28 *per mille*. Smallpox deaths were registered in 74 out of 147 registration circles and in 748 villages out of a total of 28,333 in the province. The largest number of deaths occurred in Jüne (333). The worst affected districts were Sylhet (0.66) and Nowgong (0.21). Only four towns reported deaths, Sunamganj recording the very high rate of 4.5 *per mille*.

In Madras Presidency, during 1937 the number of deaths from smallpox was 2,446, the lowest figure recorded during the past 70 years. At the same time, no district was absolutely free from infection, although the districts of Guntur, the Nilgiris, Anantapur and East Godavari reported only stray cases. The districts of South Arcot, Salem and Chingleput were worst affected each having a death rate of 0.1 *per mille*. As regards municipal towns, 24 were infected and reported 336 deaths, but Madras City was alone responsible for nearly 50 per cent. of this total.

In Bombay Presidency, the smallpox mortality curve reached a maximum in 1935 with a total of 13,405 deaths, but a decline has since been in evidence, the figures being 4,320 in 1936 and 1,810 in 1937. During the year under review, smallpox was reported from 377 villages in 138 registration circles as compared with 997 villages and 198 circles during 1936. Although the disease existed throughout the year, its highest incidence occurred during the hot weather months of March to May. The Director of Public Health reported that, although a section of the population is still opposed to vaccination, a growing demand by municipal authorities for compulsory vaccination is an indication of their recognition of the efficacy of this preventive measure. In 1934 vaccination was compulsory in only 18 municipalities; in 1936 the number increased to 41 and in 1937 to 53.

A marked rise in smallpox mortality took place in Sind, total deaths having increased from 308 in 1936 to 798 in 1937. The increase was mainly due to an epidemic in Sukkur and Larkana districts, the numbers of deaths recorded in these districts being 209 and 235 respectively.

In Delhi Province, smallpox accounted for 643 deaths or 3.9 per cent. of the total mortality. This figure was nearly three times that recorded during 1936. It may also be mentioned that, of the 643 deaths for the province, Delhi City was responsible for 601 or nearly 93.5 per cent.

Févers.

16. 'Févers' accounted for much the largest percentage of deaths in British India during 1937, the death rate under this heading alone being 13·1 *per mille* out of a total rate of 22·4 *per mille* for all causes. Repeated stress has been laid in these annual reports on the necessity for a more detailed study of the various diseases included in this group, whilst in last year's report specific attention was drawn to the imperfect classifications of deaths from 'févers' presented in their annual reports by the Directors of Public Health of Bengal and the Punjab. In his 1937 report, the latter has indicated certain errors sufficiently large to emphasise the necessity for more reliable figures if they are to serve any useful purpose. He finds that "it was customary for several compilation clerks at district headquarters to record all deaths from 'févers' under 'malaria' as a result of which the figures under the latter head were often disproportionately large. Efforts were made to eliminate this error during the year under report and consequently the recorded mortality from malaria has fallen from 168,927 in the year 1936 to 98,304 in 1937 or a decrease of 70,623 deaths. The total increase under the head 'févers' was only 1,986. Likewise the deaths from enteric fever used to be shown against typhus fever. However, as the result of departmental instructions issued on the subject, the number of deaths from typhus in 1935, *viz.*, 875 fell to 2 in 1936 and to nil in the year under review, thus indicating that the data collected under the present system are far from being accurate and complete."

Under the existing registration system, in order to obtain figures sufficiently accurate for epidemiological studies, it would seem to be advisable to limit attention to particular areas rather than to attempt improvement over a whole province. In respect of urban areas, a number of large towns and cities with trained public health staffs should be selected. In rural areas, 'health units' afford an excellent opportunity for attempting to improve statistics, whilst the various experimental schemes now in progress in different provinces for extension of medical relief to rural populations, can with advantage be utilised for the same purpose. In both rural and urban areas it is essential that health staffs should make sustained effort to improve the existing state of affairs. Only in this way can reliable statistical data be built up over a period of years. Whilst it is fully recognised that the pictures of disease incidence constructed from such statistical material may not be representative of the province as a whole, increased accuracy even in limited areas will be of great advantage to general preventive work.

Comparison of the recorded fever mortality in the various provinces during 1937 shows that the death rates ranged from 6·1 *per mille* in Madras Presidency to 21·1 *per mille* in Coorg. The rural death rate was definitely higher in every province except Madras than that for urban areas. For British India as a whole, the rural death rate from 'févers' was 13·7 *per mille* and the urban rate 7·5 *per mille*. Figures for 'févers' deaths and the corresponding rates for the provinces and for British India are given in Table A; those for rural and urban areas in Table B of Appendix II. In view of the general inaccuracy of these figures, no useful purpose would be served by making them the subject of detailed comment.

Malaria.

17. Malaria is without doubt India's major public health problem both from the point of view of morbidity and that of mortality. Whilst no province can

claim to be free from its ravages, in some the incidence of malaria is extremely high. In Bengal, it is stated that more than two-thirds of the villages are subject to malaria and that "over 60 per cent. of the total population actually suffer from it every year. Roughly about 1,000 people die from malaria every day throughout the year."* Ever since Sir Ronald Ross discovered the rôle of the anopheles mosquito in the transmission of this disease, malaria has been the subject of unremitting research in this country and, although many of the problems associated with its epidemicity and endemicity have been solved, much still remains to be done in those fields. During the past 15 years, a number of malaria officers have been appointed to provincial public health staffs and considerable light has been thrown on the malaria problems of the provinces in which these experts have been employed. At the centre, the Malaria Institute of India, maintained by the Indian Research Fund Association has within more recent years greatly developed its rôle of expert adviser to provincial and State Governments and of coordinating the development of antimalaria work throughout the country. Not only has the Institute's research work been of a consistently high order, but its annual courses of instruction continue to attract medical officers from all parts of India and thus to promote the creation of an increasing body of trained malaria workers. A review of the antimalaria work carried out within recent years, including the large programme of operations in old and new Delhi, will be found in Section XI (page 238). Whilst all these facts indicate that the problems associated with malaria have by no means been lost sight of, they are so important that much more requires to be done before any marked general reduction of malaria incidence will be obtained. Both governments and local authorities will require to allot much larger sums than in the past for anti-malarial works if permanent betterment is to be achieved. Moreover, no expenditure should in future be sanctioned by either authority until proposed preventive schemes have been thoroughly investigated and finally approved by skilled malariologists.

Table II (iv) gives the numbers of admissions from malaria in medical institutions in British India and the provinces during 1937.

Malaria cases treated in hospitals and dispensaries.

TABLE II (iv).

	Cases.	Per cent. of total cases treated.
Total	12,481,595	15.2
N. W. F. P.	539,866	21.1
Punjab	1,568,000	9.7
Delhi	94,725	10.7
U. P.	1,224,684	12.0
Bihar	1,302,498	17.4
Orissa	369,857	18.0
Bengal	3,798,933	32.1
C. P.	653,405	15.7
Bombay	588,751	15.3
Sind	242,485	23.3
Madras	1,107,937	6.0
Coorg	161,058	41.8
Assam	716,192	30.3
Baluchistan	113,204	17.0

* "Report on the Working of the Antimalaria campaign in Rural Areas of Bengal with Quinine and Plasmodin for the years 1933-1937", issued by the Public Health Department of Bengal.

These figures probably represent mere fractions of the actual numbers, but they serve to give some indication of the relative distribution of the disease in different parts of the country. It will be noted that in Coorg and in provinces like Bengal and Assam, malaria patients constitute a large proportion of the total numbers treated whilst in most of the other provinces the figures are still fairly high.

In last year's report considerable space was given to a discussion on India's quinine policy and it is unnecessary to cover the ground again, except to give details of the distribution of this drug in the different provinces. Table No. II(v) page 47 presents a convenient summary of the quantities of quinine and of other cinchona products sold and distributed free during the year under review.

In the Punjab, 1937 was on the whole a year of comparatively low malarial incidence, the total number of deaths recorded from this cause being 98,304. The sub-montane tracts of Rawalpindi, however, experienced an epidemic of considerable intensity and the districts of Muzaffargarh and Dera Gazi Khan also suffered from epidemic outbreaks. The malaria forecasts issued by the Public Health Department are stated to have "attained a considerable degree of accuracy and proved valuable in the prevention and control of the disease".

During the year, considerable progress was reported to have been made in the organisation of anti-malarial work, the object being to provide in each district an establishment "sufficient for the execution of useful routine work and capable of expansion to meet requirements should malaria assume epidemic proportions". In most districts this had already been achieved and, in eight districts where malaria incidence is ordinarily high, additional equipment and material were provided by the provincial Government. Another important feature of the reorganisation scheme was "the establishment of liaison between district board, municipal, military and railway authorities and the formation of joint malaria schemes". It is stated that arrangements have been made for entomological surveys and for the annual recording of findings so that the malaria history of the areas under investigation will gradually be built up over a period of years.

In the Punjab, quinine was distributed from 670 special centres and 3,595 sub-centres, in addition to 398 hospitals and dispensaries, tahsildars, school teachers and vaccinators all taking part in this work. The establishment of an efficient voluntary system of distribution is very much to be desired but, although the attempt was made to develop such a system in the epidemic areas, the results obtained were not very satisfactory.

In Delhi Province, a combination of circumstances arising out of failure of the monsoon and of intensive anti-malarial operations resulted in the total malaria admissions to hospitals and dispensaries decreasing from 106,755 in 1936 to 79,635 in 1937. Analysis of the dispensary figures in urban areas showed that "the maximum number of cases treated in any one week in 1937 was less than half of the corresponding figure for 1936. The total number of fever cases recorded during the malaria season in 1937 was also approximately half the number treated during the same period in the previous year". The mortality from malaria in Delhi province showed a corresponding drop from 58 cases in 1936 to 35 in 1937.

The anti-malaria operations in Delhi urban areas fall under two heads (1) permanent engineering works and (2) minor levelling and drainage works and the application of larvicides. During the year, permanent works at a cost

TABLE II (v).

	Distributed free.					Sold.					Total.					Total (Columns 10-13)
	Quinine lbs.	Cinchona lbs.	febrifuge lbs.	Total quina lbs.	Other cinchona alkaloids lbs.	Quinine lbs.	Cinchona lbs.	febrifuge lbs.	Total quina lbs.	Other cinchona alkaloids lbs.	Quinine lbs.	Cinchona lbs.	febrifuge lbs.	Total quina lbs.	Other cin- alka- loids. lbs.	
1	2	3	4	5		6	7	8	9		10	11	12	13	14	
British India.†	25,552	8,208	1,150	2,138		9,785	459	2,492	493		35,337	8,607	3,042	2,631	51,392	
N.-W. F. P.	1,234	880	..	..	..	*	..	..	..	..	1,234	880	..	..	2,114	
Punjab	3,070	496	..	..	..	..	..	..	..	..	3,070	496	..	..	3,566	
Delhi.	267	101	..	..	..	..	..	..	..	..	267	101	..	..	368	
U. P..	4,151	4,075	..	..	..	590	..	..	..	..	4,741	4,075	..	..	8,816	
Bihar	1,833	75	..	..	..	333	..	..	..	..	2,166	75	..	..	2,241	
Orissa	1,399	472	68	35	..	107	..	..	..	..	1,506	472	68	35	2,081	
Bengal	..	..	Not available.	..	..	..	..	..	Not available.	..	..	..	..	..	..	
C. P.‡	1,837	844	60	146	..	1,850	6	47	..	..	3,687	850	107	146	4,790	
Bombay	43,721	402	82	156	..	2,384	..	..	..	..	6,105	402	82	156	6,745	
Sind	1,747	243	89	216	..	696	42	..	3	..	2,443	285	89	219	3,036	
Madras	1,544	327	768	3	..	3,761	411	2,445	467	..	5,305	738	3,213	470	9,726	
Coorg	748	231	82	..	..	27	..	..	..	..	775	231	82	..	1,088	
Assam	3,886	..	..	1,582	..	37	..	..	23	..	3,923	..	..	1,605	6,643†	
Ajmer-Merwara	115	62	1	..	..	..	..	..	..	..	115	62	1	..	178	

*Quinine worth approximately Rs. 40 was sold to the villagers.

†Includes 9,752 parcels of quinine reinforced cinchona febrifuge tablets containing 279 lbs. of quinine and 836 lbs. of cinchona sold through post offices and other agents.

‡Includes 659 lbs. of quinine out of the stock received from the Government of India as free gift.

§Excluding Bengal.

||Excluding Hoshangabad district.

of over Rs. 11,11,000 were successfully completed and a further sum of Rs. 94,000, half of which came from the Government of India and the other half from the combined local authorities, was spent on other antimalarial measures.

For anti-malarial work in the rural areas of Delhi province, two grants were made available by the Indian Research Fund Association. One of Rs. 50,000 spread over five years was given for work in the Najafgarh Health Unit Area ; the other of Rs. 1,500,000 also spread over five years, was allotted for anti-malarial measures in the rural areas, immediately surrounding the cities of Delhi and New Delhi, these operations being planned as a corollary to the urban operations carried out by other agencies. In Najafgarh *thana* certain temporary measures were adopted including the oiling of unused wells, the regular emptying of cattle troughs, the bi-weekly treatment of village ponds with paris green and the application once a week of oil or paris green to burrow-pits and local collections of water. In addition, the distribution of quinine to ' fever ' cases is practised during the malaria season.

As regards the areas lying around Delhi and New Delhi it was considered that the grant could best be spent on permanent works of lasting benefit in a number of villages and on the institution of spraying experiments against adult mosquitoes in village houses, in the hope that this method of control, which had already proved successful might be continued by the villagers themselves. In addition quinine treatment was provided for all the 60 villages included in the area.

Malaria is by far the most serious public health problem in Orissa. The coastal villages of Ganjam district experienced a severe epidemic which continued almost throughout the year, 417 villages being affected and nearly 73,000 cases being treated in hospitals and dispensaries. One hundred and fifty pounds of quinine sulphate were supplied by Government and 40,000 quinine tablets were purchased by the District Board, both these amounts being distributed free.

An experiment was instituted for the control of malaria in the villages bordering on Chilka lake in Puri district this area being regularly subject to epidemics. The village of Balugaon which was worst affected was selected and operations included clearance of weed from the foreshore of the lake, which was considered to be responsible for the breeding of mosquitoes, and treatment of the whole population, men, women and children, with quinine and plasmo-chin. The results of this experiment are reported to have been extremely satisfactory and it has therefore been proposed that during 1938 the same measures should be applied over a larger area, 25 miles in length and four miles in breadth, lying along the margin of the Chilka lake. The districts of Cuttack and Balasore also experienced severe outbreaks of malaria and a special malaria staff provided with necessary medicines was deputed by Government. In Koraput, Jeypore, Padwa and Pottanghi, anti-larval operations, such as paris-greening and oiling of breeding grounds, were continued. Towards the close of the year Government sanctioned the appointment of a Provincial Malaria Officer and with this appointment it may be hoped that the provincial anti-malaria campaign will be conducted on a more systematic and efficient basis.

In order to assess the effect of paris green on rice crops a field experiment was conducted at the Government Agricultural Farm, Cuttack, the Bengal Nagpur Railway participating by providing free of cost the necessary materials and apparatus. A one per cent. mixture of paris green with powdered soap stone was used at the rate of one pound per acre. The purpose of the experiment was to study the effect of paris green on rice plants in the flowering

stage ; comparison of the average yields of treated and untreated plots showed that the latter had a higher production to the extent of one maund and seven seers, but this difference was not held to be statistically significant.

In Orissa, quinine worth Rs. 2,142 was sold during 1937 to the public through post offices and other vendors ; in addition, 220 lbs. of quinine sulphate, costing Rs. 3,960 were distributed free in malaria-stricken areas. These quantities were 'additional to those normally purchased by the Provincial Government and by local bodies for the ordinary requirements of the districts.

In Bombay Presidency, 25,373 deaths from malaria were recorded during 1937 as against 27,307 in 1936. The urban and rural malaria death rates were 0.54 and 1.63 *per mille* respectively as compared with 0.48 and 1.78 in the previous year. The largest number of deaths was recorded in the district of Nasik (6,117) and the smallest in Kanara (867). The highest number of malaria deaths was recorded in December and the lowest in June.

In Madras Presidency, the campaign against malaria included investigations carried out in various parts of the province, advice to eight municipal authorities in respect of measures for control of mosquito breeding and free distribution of quinine to the people of affected areas in 15 districts. Under a scheme financed partly by the Madras Government and partly through a grant from the Indian Research Fund Association, Wynaad taluk in Malabar district, Pattukottai taluk in Tanjore district and the coastal areas north of Madras City were selected for experimental study after preliminary investigations. In connection with the commencement of operations for the Papanasam hydro-electric scheme, a detailed malaria survey was carried out for the purpose of selecting safe sites for the labour camps and of taking necessary measures for the prevention of outbreaks of malaria which would interfere with the construction programme. Anti-malarial operations were also continued in Hospet, Krishnadevipeta, Rameswaram and Vriddhachalm, the results in all cases being reported as satisfactory.

As regards the quinine distribution scheme, approximately 1,600 pounds of quinine were distributed free in addition to its sale through post offices. "Treatments" of 10 or 20 tablets have been made available in order to impress on the people the necessity for a minimal course of the drug for the cure of malaria. The services of village headmen and schoolmasters have been utilised for extending the sales of quinine.

In Bengal, deaths ascribed to malaria numbered 372,992, an increase of 10.3 per cent. over the figure for the previous year. During 1937 malaria was recorded as responsible for 48.1 per cent. of the total fever mortality and for 30.2 per cent. of the total provincial mortality from all causes. The Director of Public Health remarks that, "in view of the magnitude of the ravages which are caused from year to year by malaria, the effective control of this scourge solves practically the main public health problem of the province". The districts with the heaviest malaria mortality were Rajshahi (18.7 *per mille*) Jessore (13.9 *per mille*), Dinajpur (13.6 *per mille*) and Nadia (12.9 *per mille*) whilst at the other end of the scale were Calcutta City (0.5) and the adjoining districts of Howrah (0.9) and 24-Perganas (1.6). No district was completely free from the disease, but it is reported that 15 towns recorded no malaria during the year.

The total quantity of quinine sold during 1937 through post offices was 8,729.8 lbs. and, compared with the previous year, every district except Chittagong reported increased sales. Available figures show that, whilst the fever index rose by 4.7 per cent., the consumption of quinine per head of the population based on sales rose by 45.3 per cent.

In Bihar, areas which experienced repeated epidemics of malaria include (1) a long narrow strip of territory in North Bihar contiguous to Nepal; (2) the endemic areas of Champaran and Purnea; (3) a group of villages on the outskirts of the Chota Nagpur plateau; and (4) scattered areas in the districts of Ranchi, Hazaribagh, Palamau, Singhbhum and Manbhum. During 1937 a severe epidemic of malaria is reported to have occurred in certain parts of North Bihar, particularly in the districts of Muzaffarpur, Darbhanga, Bhagalpur and Purnea; this was the continuation of a similar outbreak in 1936. The highest death rates were recorded in the districts of Purnea (27.0), Palamau (24.0), Bhagalpur (23.1), Darbhanga (20.2), Muzaffarpur (19.7) and Hazaribagh (18.4). An increased incidence of malaria in these districts of North Bihar has been noticed since 1932 and so far no indications of a decline have become apparent.

Quinine was sold in 'treatments' of 20 tablets of four grains each at post offices, 332.5 lbs. being sold as compared with 406.9 lbs. in 1936. The decreased sales are said to be due to the free distribution of large quantities of the drug in the malaria-stricken areas.

The number of malaria deaths reported in the Central Provinces during 1937 was 267,588, a decrease of 7,082 over the previous year. Approximately 53 per cent. of the total mortality of the province was registered under this cause. The worst affected districts were Bilaspur, Raipur, Saugor, Hoshangabad, Chanda, Nagpur and Amraoti.

In Sind, deaths due to malaria numbered 1,512, as compared with 1,627 in the previous year. The highest mortality was recorded in November and the lowest in February. For rural areas the districts of Karachi (0.24) and Dadu (0.16) registered the highest death rates, whilst the lowest was that of Nawabshah (0.09). High rates were recorded in the urban areas of Ghotki (6.63), Shikarpur (5.78), Rohri (5.27), Sehwan (4.88), Larkana (3.54), Hyderabad (3.44).

As regards anti-malarial measures, Karachi had a fairly adequate preventive staff and Hyderabad a smaller anti-mosquito brigade. In other municipalities, to which Government subsidies were given, the work was carried out by the respective health staffs. In some towns oiling and filling up of pits were carried out and in others quinine was distributed free. For the rural areas, ten temporary touring medical officers were appointed during the malaria season and these worked in areas where medical aid was not ordinarily available. In addition to treating patients for malaria or other complaints, they took splenic indices, mapped out mosquito breeding places, sent mosquitoes and blood slides to headquarters for examination and advised villagers on the value of quinine treatment and on simple preventive measures.

Other anti-malaria measures included the manufacture and sale of cheap mosquito nets, education of the people by widespread distribution of posters, leaflets, etc., the opening of a fishery for the supply of larvivorous fish to local bodies, and the free distribution of quinine to the rural population by officers of the Public Health, Revenue and Educational Departments, by administrative officers of district boards, by voluntary societies and by post offices. During the financial year 1937-38 the Government of Sind sanctioned Rs. 30,000 for the cheap sale and free distribution of quinine.

In Coorg, a late monsoon resulted in the conversion of many of the free flowing streams into continuous breeding places and a slight increase in the incidence of malaria took place in April, May, June and July. Systematic

anti-malaria measures were adopted, under the supervision of the Health Unit staff, in Mercara, Virajpet, Sunticoppa, Fraserpet, Somvarpet, Sidapur, Gonikopal, Pounampet and Srimangala. Every co-operative society in Coorg has formed sanitary sub-committees and, through both co-operative societies and village *panchayat* boards, anti-malaria work was carried out in a number of rural areas. Antimalarial operations were started during 1936 in the forest area at Makut and, in view of the good results obtained, the residents of Tittimatti forest area started similar work, on their own initiative, in November, 1937. Some of the European and Indian owners of coffee and rubber estates have also carried out anti-malaria work at their own cost, free technical advice being given to them by the health staff whenever required.

A free gift of 250 lbs. of quinine was received from the Government of India, and in addition, another 175 lbs. were made available for distribution. Quinine was distributed to the public through officials of the revenue department, village headmen, school-masters, post offices and co-operative societies. At the hospitals of Mercara and Virajpet and at all dispensaries in Coorg, limited supplies of atabrin and plasmochin were made available to those who could not afford to buy these drugs.

The Coorg Malaria Committee, which had been in existence since 1931, was reconstituted as the Coorg Health Committee, but one of its chief functions continues to be that of intensifying and enlarging anti-malarial operations in the province. A considerable amount of general health education work, including the prevention of malaria, is reported to have been carried out during the year.

Dysentery and Diarrhoea.

18. Owing to the difficulties of making differential diagnoses in areas without adequate medical supervision, dysentery and diarrhoea are classified together. These diseases were together responsible for 267,479 deaths or over two and a half times the number of cholera deaths. For the decennium 1928-37, the average annual cholera mortality was 198,985, whilst the corresponding figure for dysentery and diarrhoea was 250,582. These three bowel diseases, therefore, constituted about 7.3 per cent. of the total mortality from all causes during the past 10 years. The total mortality from dysentery and diarrhoea in the different provinces of British India has been compared with other important groups of causes of death in Table A, Appendix II. Similar figures for rural and urban areas have been given separately in Table B, Appendix II. Mortality figures from these diseases for British India and for the individual provinces and their monthly distribution are given in Tables K and L, Appendix II; urban and rural mortality rates are given in Table K. The maximum incidence occurred during the monsoon period and the lowest incidence during the driest part of the year.

The general urban mortality rate was 2.2 *per mille* and the rural rate 0.9 *per mille*. Similar differences were recorded in every province, but were more marked in some cases. For instance, in Coorg, the urban rate was 5.0 *per mille* as compared with a rural rate of 0.6 *per mille*; in Ajmer-Merwara and Madras Presidency these rates were 3.1 and 0.02 *per mille* in the former and 4.3 and 1.6 *per mille* in the latter. Attention is once more drawn to the necessity for investigation of these variations.

The following figures for cases treated in hospitals and dispensaries in British India give some idea of the relative prevalence of amoebic and bacillary dysenteries in the provinces :—

TABLE II (vi).

Cases treated in hospitals and dispensaries during 1937.

Province.	Amoebic dysentery.	Bacillary dysentery.
N.-W. F. P.	9,522	25,889
Punjab	70,396	87,310
U. P.	92,847	66,596
Bihar	115,391	37,203
Orissa	28,728	6,727
Bengal	242,543	40,159
C. P.	25,427	31,139
Bombay	42,310	20,157
Sind	14,261	3,911
Madras	213,224	104,244
Coorg.	6,005	1,642
Assam	25,560	20,495
Baluchistan	75	2,417

Enteric Fever.

19. This disease is without doubt much more widely prevalent than recorded figures indicate. The absence of adequate medical services and of facilities for serological diagnosis render it almost impossible for enteric and other types of continued fever to be diagnosed properly, whether in rural or urban areas. Moreover it is almost certain that large numbers of mild cases are never recorded. For instance during 1937, the Chief Medical Officer, Delhi Province, reported 650 cases and 536 deaths from enteric fever, giving a fatality rate of 82.5 per cent. Rosenau states, that for typhoid, "the case fatality rate averages about 10 per cent. being more constant than for most epidemic diseases. It has been found to vary from 5 to 12 per cent. in private practice, and from 7 to 20 per cent. in hospital cases." Although the fact that a large proportion of cases in India does not receive skilled medical and nursing attendance must be responsible for a rise in the case mortality rate, the differences between the rate in Delhi and those given by Rosenau are so large that they can scarcely be explained in terms of this factor alone. The recorded figures therefore provide no indication of the true incidence of the disease.

For other provinces complete statistics for the total area are not available. During the year under review 91, 119, 19, 154 and 1,712 deaths were recorded in the municipal towns of the North-West Frontier Province, Bihar, Orissa, Ajmer-Merwara and Madras Presidency respectively. Coorg reported no deaths and 91 deaths were recorded in 13 towns of Assam. In the Punjab, deaths from this cause numbered 8,045, giving a rate of 0.3 *per mille*. In Bombay Presidency, deaths from enteric fevers decreased from 6,311 in 1936 to 6,105 in 1937; in the Central Provinces, from 3,081 to 1,457; in Sind, from 416 to 371; whilst, in Bengal Presidency, the mortality figure rose from 8,369 to 8,978. In the Central Provinces, as many as 1,183 deaths occurred in rural areas whilst only 274 were reported from urban areas. In Sind, the cities of Karachi and Hyderabad reported 35 and 43 deaths respectively. Anti-fly measures, T. A. B. inoculations and disinfection of infected houses were reported to have been carried out. Of the total in Bengal Presidency, 6,844 deaths were recorded in rural areas, 1,126 in Calcutta City and 1,008 in other towns.

Table II (vii) gives the numbers of cases treated in hospitals and dispensaries in the different provinces. These figures give some slight idea of the prevalence of the disease.

TABLE II (vii).

Province.	No. of cases treated.	Province.	No. of cases treated.
N.-W. F. P.	4,857	C. P.	2,373
Punjab	19,666	Bombay	6,142
Delhi	903	Sind	2,760
U. P.	10,198	Madras	22,773
Bihar	7,904	Coorg	169
Orissa	634	Assam	918
Bengal	22,506	Baluchistan	137

Respiratory Diseases.

20. Deaths from respiratory diseases in British India numbered 487,319 during 1937 as against 493,441 during 1936, the rate of 1·8 *per mille* being approximately the same in both years. The numbers of deaths from these diseases for British India and the different provinces are shown in Table M, Appendix II; they have also been classified under rural and urban and male and female headings, the corresponding rates being also given. Table N of Appendix II gives the monthly distribution. The rates for rural and urban areas in British India are 1·3 *per mille* and 6·0 *per mille* respectively and a higher rate in urban areas is found in every province except Delhi and Bihar. Rural rates range between 5·4 *per mille* for Delhi and 0·02 for Ajmer-Merwara, whilst urban rates lie between 15·9 in Ajmer-Merwara and 0·6 in Bihar. The higher incidence of respiratory diseases among urban populations, which these rates suggest, is probably due to greater accuracy in registration in those areas.

The male death rate for British India as a whole is 2·0 and the female rate 1·6 *per mille*. The higher incidence among males is common to most provinces, but the disparity between the sex rates is definitely less than that between urban and rural rates in every province.

As regards seasonal distribution, the largest number of deaths from respiratory diseases in British India was recorded in December and, in nearly every province, the combined figure for December and January is larger than that of any other two consecutive months. Generally speaking, the period of lowest incidence occurred during June and July.

In last year's report, attention was drawn to the urgent necessity of differentiating some of the groups of figures included under this head. Conditions like pneumonia and pulmonary tuberculosis undoubtedly contribute appreciable percentages of the deaths recorded under 'respiratory diseases' and a much clearer perception of the part played by these diseases is essential if suitable preventive measures are to be formulated. Whilst a general improvement in the registration of vital statistics must await an expansion of qualified health services both in urban and in rural areas, much might now be done where health staffs exist. It is to be hoped that, where necessary facilities exist, health authorities will make every effort to carry out surveys into the incidence of specific causes of ill-health and death.

Pneumonia.

21. The importance of pneumonia as a cause of death may be judged from the following figures which have been taken from a few of the provincial health reports. Figures have been given only for towns, because of the greater accuracy in registration in these areas and because it is possible to make comparison with these figures between different areas. The figures in brackets represent rates *per mille* of the population.

TABLE II (viii).

Deaths from respiratory diseases in certain provinces.

Province.	Pneumonia	Pulmonary tuberculo- sis.	Other respira- tory diseases.	Total.	Pneumonia deaths as percentage of total re- spiratory deaths.
Madras Presidency	6,674	6,626	10,300	23,600	28.3
(Municipalities only) . . .	(1.80)	(1.79)	(2.78)	(6.37)	
Delhi Province	1,030	922	565	2,517	40.9
(Towns only)	(2.35)	(2.09)	(1.29)	(5.73)	
Sind	2,659	1,061	995	4,715	56.2
(Towns only)	(3.87)	(1.54)	(1.44)	(6.85)	
Punjab	8,227	2,428	4,520	15,175	54.2
(Towns only)	(2.80)	(0.83)	(1.54)	(5.17)	
The United Provinces . . .	16,655	5,304	15,148	37,107	44.8
(Towns only)	(3.07)	(0.98)	(2.79)	(6.84)	
Orissa (Municipalities only) .	99	6	254	359	27.5

Although the figures in this table cannot be considered as presenting an accurate picture of these causes of death, it is clear that pneumonia forms an important cause of sickness and mortality.

At the Inter-Governmental Conference of Far-Eastern Countries on Rural Hygiene held in Java in August, 1937, it was pointed out that the pneumonia problem had two aspects, one as regards adults and the other as regards children. In respect of children, pneumonia is not a primary disease but a complication of other diseases and the sub-committee, which discussed this question, while recognising that pneumonia was responsible for at least 30 per cent. of the deaths among children, emphasised that "the attack should be upon the various diseases and malnutrition ultimately responsible" for its high incidence in the child population. In regard to adults the Conference passed a resolution to the effect that "in most eastern countries, pneumonia is one of the principal causes of death, especially among labourers exposed to changing conditions of temperature and overcrowding. As yet there is no form of specific treatment or method of prevention of which the value is universally recognised. Further research on these problems is highly desirable. In this connection, attention should be given to the living accommodation of labourers and others, especially that of new-comers."

The problem of pneumonia, therefore, like that of other major causes of social ill-health, seems to be one of improving man's standard of living and of providing him with those amenities essential for a healthy life. Whilst the general health campaign, directed towards improvement of environmental hygiene, may be expected to help in these directions, the pressing needs of the

moment, particularly in India, are for a clearer definition of the problem by special enquiries instituted for the purpose and for research as to suitable lines of attack based on the information made available by these enquiries. Small scale but useful investigations might be undertaken with advantage in large hospitals and in medical colleges both in the form of laboratory and clinical research and by visits to the homes of the pneumonia patients. In this way information would gradually be collected regarding the clinical, pathological and bacteriological aspects of the disease and, concomitantly, data relating to general environmental conditions. Supplementary studies might deal with the incidence of the disease in a selected community over a period of years. By some such methods, valuable information could be gradually made available, sufficiently accurate to provide the basis on which a really scientific preventive campaign could be planned.

Tuberculosis.

22. The main features of the tuberculosis problem in India have been given in some detail in the reports for 1935 and 1936. Whilst few reliable statistics are available to permit of a correct estimate of the extent to which this disease has permeated throughout different parts of the country, there is no question that tuberculosis is on the increase. The growth of industrialism, with its attendant evils of overcrowding and insanitary slums, and the rapid exchange of populations between urban and rural areas which modern transport facilities have made possible, are both contributing towards dissemination of infection in the relatively uninfected rural areas much more quickly and easily than could occur in the past. "Some workers hold that the extent of tuberculation of the population in India today is midway between that of the virgin African races and the highly urbanised and industrialised European races and that India perhaps stands in this regard on the same level as China."*

Fortunately, the Indian public are becoming increasingly alive to the growing menace of this disease, and as may be seen from section XI, (page 240), organised effort has made some progress in the campaign against this social evil. The recent generous response from the people of India to Her Excellency Lady Linlithgow's appeal for the King Emperor's Fund and the formation of Central, Provincial and State Tuberculosis Associations mark important advances. What is now most urgently needed is the carrying-out of intensive surveys in local areas in order to determine the extent and nature of the infection in sample groups of the population. For the formulation of reasoned ameliorative measures to be carried out over a period of years, these surveys should provide data without which administrative officers will be working to a great extent in the dark. It is of the greatest importance that every anna of the available money should be spent wisely and to the maximum advantage; without the data obtained from these surveys neither Governments nor local authorities nor voluntary organisations will be able to avoid waste of effort or waste of the all-too-scanty funds at their disposal.

Provincial medical and public health reports give only meagre details regarding tuberculosis in their respective areas, but such information as is available has been summarised in the following paragraphs.

*"Tuberculosis in Rural Areas" a note by Dr. A. C. Ukil in the preparatory papers relating to British India for the Inter-Governmental Conference of Far Eastern countries on Rural Hygiene in 1937.

A total of 10,738 cases of pulmonary tuberculosis was treated in medical institutions in the North-West Frontier Province during 1937 as against 11,261 in 1936. As the scheme for establishing a sanatorium at Dadar in Hazara district had not materialised, the previous practice of reserving 10 beds for patients from the province at the Jubilee Sanatorium, Samli, Murree Hills, continued as a temporary arrangement during the year.

In the Punjab, although the Director of Public Health considers that the incidence of the disease is on the increase, available figures are too defective to give an indication of the true state of affairs. Lack of funds has so far stood in the way of establishing an anti-tuberculosis organisation, but the Government gave grants-in-aid, as in previous years, to the King Edward Sanatorium at Dharampore and to the Samli Sanatorium in the Murree Hills. In four towns, well-equipped tuberculosis dispensaries are functioning under the charge of whole-time municipal medical officers of health. A considerable amount of propaganda has also been carried out by the health staffs both in towns and villages.

The Chief Health Officer of Delhi Province considers that the 1,022 deaths recorded as due to pulmonary tuberculosis give an under-estimate of the mortality from this disease. On the assumption that at least five per cent. of deaths due to respiratory diseases and another five per cent. due to 'other fevers' can be ascribed to tuberculosis, he estimates the tuberculosis deaths as approximately 1,223. If, for every death ten persons suffer from this infection, the number of cases in Delhi Province must be in the neighbourhood of 12,000. As the estimated population of the province in 1937 is nearly 700,000, these figures suggest that the incidence of tuberculosis may be as high as 17 per 1,000 of the inhabitants, a figure which would seem to justify the Chief Health Officer's remark as to "the insidious but rapid growth of this disease". For the urban areas some provision for treatment exists at the Queen's Road Tuberculosis Clinic in Delhi city and at the Sri Ram-Krishna Clinic. Further, sanatorium treatment is available at the Silver Jubilee Sanatorium, the New Delhi Municipal Committee and the Notified Area Committee having reserved four and two beds respectively in this institution. Reservation of beds is possible also at the Lady Irwin Sanatorium at Jubbah in Simla Hills, but most of the cases decline the offer of treatment in the hill sanatorium.

The advanced patient, who has gone beyond the stage of recovery and is constantly disseminating infection, is an urgent problem demanding earnest attention. Such cases are obviously unfit for admission into an expensive institution like a sanatorium, whilst unsatisfactory home conditions and economic distress may render domiciliary care nugatory of results. The development of village settlements, with simple, well-designed huts, where the patient could be cared for by a member of his family under the supervision of the staff of a neighbouring sanatorium, would appear to be a desirable line of advance.

In the United Provinces, 5,635 deaths were recorded from pulmonary tuberculosis, 175 from tuberculosis of joints and 1,159 from other forms of tuberculosis. Under all heads, deaths in urban areas numbered 6,355 and in rural areas 614.

In Bihar, in October, 1937, an officer was appointed to organise campaigns against both leprosy and tuberculosis. In order to provide anti-tuberculosis clinics at the headquarters of each of the 16 districts of the province, a sum of Rs. 10,000 was also allocated to each town out of the King George V Memorial Fund. The recurring costs of these district clinics are to be met partly from contributions promised by local bodies and partly from funds raised locally

and from Government contributions. In addition, a systematic campaign of education of the people in respect of this disease is reported to have been carried out. A tour in Ranchi, Itki and Patna in July by the Organising Secretary of the King George Thanksgiving Anti-Tuberculosis Fund helped to stimulate interest.

In Bengal, recorded deaths from pulmonary tuberculosis during 1937 numbered 14,668 as against 15,266 in 1936. Of the 4,493 deaths recorded in all towns during 1937, Calcutta was responsible for 69.1 per cent.

In Madras Presidency, statistics relating to pulmonary tuberculosis are available only from municipalities. The deaths recorded under this cause numbered 6,626 or five per cent. of the total mortality.

In the Central Provinces, pulmonary tuberculosis is stated to be prevalent in the large towns. In the hill stations of Chhindwara and Seoni and in the old walled-in houses of Burhanpur and Ellichpur the disease shows a marked prevalence. The Provincial Government sanctioned four tuberculosis clinics; two were under construction during the year at Nagpur and Jubbulpore, whilst at Raipur and Amraoti existing buildings were utilised.

In Sind, recorded deaths numbered 1,506 in 1937 as against 1,584 in 1936. The Director of Health Services points out that these figures give no true indication of the actual incidence of the disease. At the Karachi Municipal Tuberculosis Dispensary alone, among 108,914 patients who attended, 89,509 were suffering from tuberculosis and, among 1,250 new cases 980 were diagnosed as tuberculosis. Propaganda is being carried on by the public health staffs as well as by the anti-tuberculosis sub-committee of the provincial branch of the Indian Red Cross Society.

The King George Thanksgiving Anti-Tuberculosis Fund continued during 1937 to function as a central organisation for co-ordination of the general campaign against tuberculosis. By means of its headquarters staff in New Delhi and its sixteen provincial and State branches, this organisation carried through a useful programme of work. That programme included the training of tuberculosis workers, the issue of a special Tuberculosis Number of the Indian Medical Gazette, containing articles from workers in different parts of the country on various aspects of the problem, and educational activity in co-operation with other voluntary and social organisations. Post-graduate courses for medical men in modern methods of diagnosis, treatment and prevention of tuberculosis were also conducted at Calcutta, Madras and Bombay, 71 workers in all being trained. The increasing interest evinced by the medical profession in the subject is evident from the fact that, for the 75 seats available in these three courses, 655 applications were received from medical men. Educational activities included the free supply of over 4,100 pamphlets and leaflets and over 14,000 posters to educational institutions and public health workers, the issue of a pamphlet entitled "Knowledge of Tuberculosis in Pictures" and a leaflet, "The Tuberculosis Clinic", and co-operation with child-welfare organisations at headquarters and in the provinces for promoting education of mothers in respect of tuberculosis. Lantern slides, cinema films and other propaganda material were supplied by the Fund for the latter purpose.

Developments of special interest in connection with the activities of the provincial and state branches included (1) the opening of six tuberculosis clinics in Bombay Presidency by the joint efforts of the Bombay Government and the local Red Cross, helped by a grant from the Central Fund Committee; (2) the development of a number of solaria in Mysore on the lines of the day preventoria and sanatoria in Poland; in Mysore, where the tuberculosis and maternity and child welfare services are co-operating together, children

from homes where tuberculosis cases were discovered are encouraged to attend solaria for a definite period each day. In addition to graduated sun exposure, they are given extra milk, cod liver oil and necessary medicines. This is a hopeful line of development for a country like India where it is so necessary to awaken response from the people by direct contact with them in their homes and where hospital and sanatorium accommodation for patients must necessarily remain limited; (3) the opening of tuberculosis clinics in various centres; and (4) educational work in respect of this disease by different branches of the Fund.

Epidemic Dropsy.

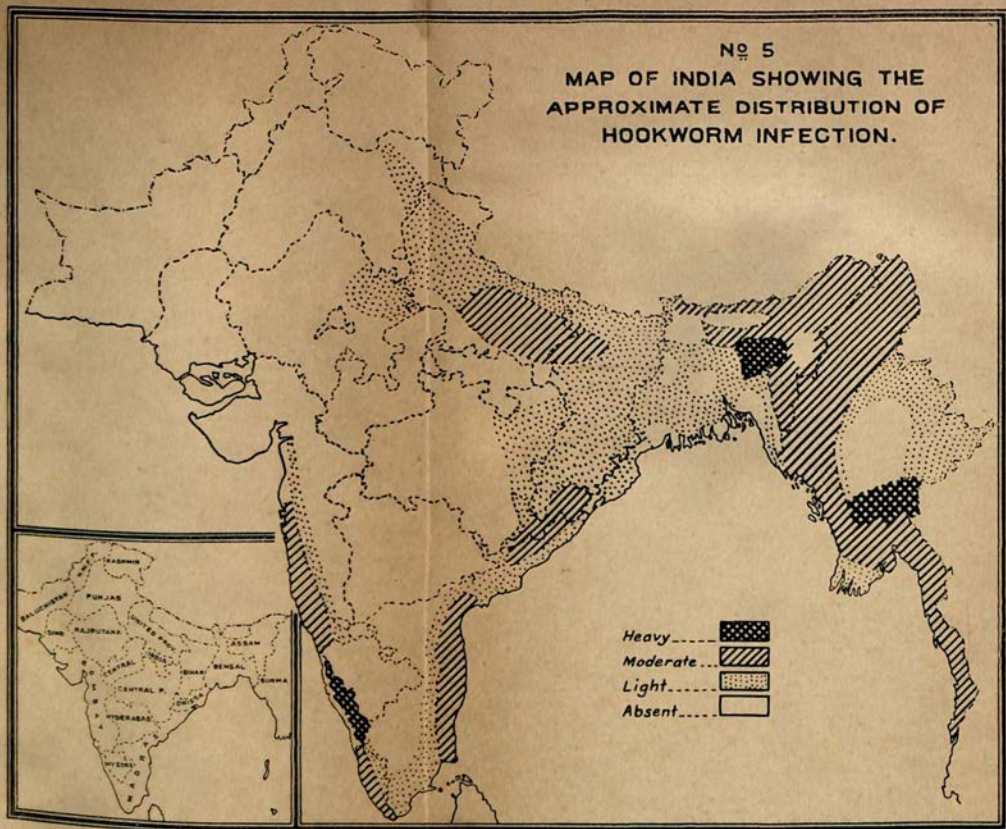
23. The aetiology and epidemiology of epidemic dropsy have been the subject of investigations during the past sixteen or seventeen years at the Calcutta School of Tropical Medicine and more recently at the All-India Institute of Hygiene and Public Health. The work carried out during 1937 has been summarised in Section VIII of this report. Whilst the earlier idea was that the condition was due to an infection introduced through damaged rice, recent work has tended to show, both on epidemiological grounds and on the result of human feeding experiments, that the disease is caused by some deleterious substance introduced through mustard oil used for cooking. Although it cannot be claimed that all obscure points in the epidemiology of the disease have been elucidated, recent work has undoubtedly rescued research on this problem from the blind alley into which it seemed to have passed. Within the past three or four years intensive studies have been conducted both in the field and in the laboratory and it is to be hoped that these studies will result in the development of an effective preventive campaign against this serious disease.

Epidemic dropsy is mainly, though not exclusively, confined to Bengalees who use mustard oil for cooking purposes and the disease is therefore mostly prevalent in North Eastern India, including Bengal, Bihar, Orissa, Assam and certain portions of the United and Central Provinces. Ignorance of the causative factor and the presence of certain common characteristics between epidemic dropsy and the 'wet' form of beri-beri have resulted in an indiscriminate use of these terms for the same condition. The figures given below therefore include those for beri-beri as well as for epidemic dropsy.

In the municipal towns of Orissa, five deaths from this cause were recorded; in Assam four cases were reported from Habiganj town. In Bengal Presidency deaths due to this cause numbered 1,697, as against 2,030 in the year 1936; of these, 1,036 deaths were recorded in rural areas, 487 in Calcutta City and 174 in other towns. In Bihar, no epidemic occurred but sporadic cases were reported from every district. In the Central Provinces 54 unconfirmed deaths from this cause were reported. In the United Provinces, the total number of deaths reported was 64 as against 145 in 1936. The disease was fairly widespread in the cities of Benares, Allahabad and Cawnpore and an officer of the United Provinces public health department was therefore placed on special duty to investigate its cause. In Benares and Allahabad, the disease was mainly confined to Bengalees. In Benares, both sexes of all ages were reported to have been similarly affected. In Allahabad, children under 10 years were stated to have been much less affected than those at higher ages. Sixty-five per cent. of the cases studied in this town used mustard oil from a common source. The Cawnpore outbreak presented a striking contrast to those of Allahabad and Benares in that 97.5 per cent. of the cases occurred not among Bengalees but among persons belonging to the province. Whilst the large majority of cases occurred amongst 'partial' rice eaters who were also using

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MAP OF INDIA SHOWING THE
APPROXIMATE DISTRIBUTION OF
HOOKWORM INFECTION.



NOTE—Modified by Drs. P. A. Mapleston & A. K. Mukerji from Dr. Chandler's map in the Indian Journal of Medical Research, Volume XV, page 740.

mustard oil, a few cases were reported from those whose diet included neither rice nor mustard oil. The clinical manifestations of the disease, including the occurrence of glaucoma in some cases pointed to the condition being epidemic dropsy and not beri-beri.

Hookworm Infection*.

24. Infection with hookworm may be found in those countries which lie between 36° north and 30° south of the equator ; outside these latitudes it may occur in the temperate zones in such warmer places as deep mines and tunnels. " In localities where the temperature remains continuously above 70° F. hookworm infection thrives. Any area that has a minimum night temperature below 50 degrees for a considerable portion of the year does not have much infection ". The eggs and larvae of the worm are not able to withstand dessication and " in localities where the total annual rainfall is less than forty inches hookworm disease does not get a foothold." Another factor influencing the distribution of the infection is the nature of the soil, clay being unfavourable while sandy or sandy-loam soil is favourable.

The distribution of hookworm infection in India is shown on the accompanying map, which has been modified by Drs. Maplestone and Muckerji from one prepared by Dr. Asa C. Chandler a few years ago. Heavily infected regions include Upper Sylhet and Cachar in Assam and the tea gardens in Assam Valley ; the Dooars and Darjeeling District in Bengal ; and in South India, all the tea and coffee plantations in Coorg and neighbouring areas and, on the west coast, Travancore and South Kanara. Infection of moderate intensity exists in Central Bihar, the eastern part of the United Provinces, along the foothills of the Himalayas, some parts of Assam and Surma Valleys and certain areas in Madras Presidency. " About 60 to 80 per cent. of the population of Bengal, Bihar, Orissa, eastern parts of the Central Provinces, some parts of the United Provinces and of the Punjab and also the east coast of Madras are infected but the average number of worms harboured by the individual is not large ". North-West Frontier Province, Rajputana, Sind, Kathiawar, Central Indian States, Hyderabad (Deccan), and Mysore are stated to be practically free from infection.

Of the two known species of hookworm, *Ancylostoma duodenale* is predominant in Europe, North Africa, Western Asia and North China, whilst in other parts of the world the species present is *Necator americanus*. The *Necator* is that most widely prevalent in South India, Bengal and Burma, the *Ancylostoma* being found to the extent of only 5 per cent. in Madras and 20 per cent. in Bengal. In Bihar, the two species are present in equal proportions and in United Provinces and in the Punjab, the *Ancylostoma* is the prevailing type.

The effect of hookworm infection on a community has been excellently described in the 1917 report of the International Health Board of the Rockefeller Foundation. " Hookworm disease is never spectacular like yellow fever or pernicious malaria. And for this very reason it is the greater menace. Acute diseases sometimes tend to strengthen the race by killing off the weak : but hookworm disease, working so insidiously and frequently escaping the attention even of its victims, tends rather to debilitate the race by attacking the strong as well as the weak. The cumulative effects of the disease on the race,—physical, economic, intellectual and moral,—which are handed down

*The material for this note has been largely taken from the Health Bulletin entitled " Hookworm Infection in India ", by Drs. P. A. Maplestone and A. K. Muckerji, copies of which can be obtained from the Manager, Government of India Publications, Delhi.

from generation to generation through long periods of time, are even more important than its contribution to the death roll among individuals. This one disease, where the infection is practically universal may go far towards explaining the retardation of backward peoples."

The prevalence of hookworm disease in a community may be considered a fair index of the level to which the practice of hygiene has developed in that community. Whilst certain natural factors, to which attention has already been drawn, are important, indiscriminate pollution of the soil by human excreta plays a most important part in the propagation of the disease. Further, the graver manifestations of infection seem to be more frequently associated with poverty, malnutrition and a low standard of living. The presence of a few worms in the bowel of a well-nourished and healthy person apparently produces little ill-effect; on the other hand the lack of stamina associated with poverty aggravates the effect of the continuous loss of blood and irritation of the intestine produced by the worms. The campaign against hookworm infection is therefore essentially one whose objects are a higher standard of environmental hygiene and an improvement in the standard of life, so that the general power of resistance to disease may be increased. A well planned programme against hookworm is one of the most suitable methods of bringing home the benefits of organised public health effort and the activities of the Rockefeller Foundation in this connection have given ample proof of the value of such work.

As regards provincial activities, considerable attention is being paid to this disease in the provinces of Madras and the Punjab; in addition plantation authorities are devoting much time, energy and money to anti-hookworm work among their labour populations. In Madras Presidency, a number of rural sanitation units, each consisting of a trained medical man and assistants, have been organised for work in the districts, and their activities are coordinated by a special health officer in the office of the Director of Public Health. These units are engaged on hookworm surveys, propaganda work on the disease and on the dangers of soil pollution, mass treatment and construction of bore hole and trench latrines in rural areas. In the Punjab, a hookworm survey was started in 1934; during 1937, five more districts were surveyed, bringing the total so far completed to 20. Rates of infection were 39 per cent. in Karnal, 13 in Rohtak, 21 in Gurgaon, four in Hissar and seven in Ferozepur. Four treatment units, employed for mass treatment worked during the whole year in Gurdaspur district, 49,423 persons being treated. The number treated since the commencement of the campaign in 1934 now totals 263,070.

Leprosy.

25. The leprosy problem in India has been discussed at some length in the last two reports and a review was also given of the activities of Governmental and voluntary organisations engaged in leprosy relief. In respect of this disease as in other major health problems such as tuberculosis, the modern tendency is to set up special machinery and to some extent, this is inevitable because of the necessity for specialisation in respect of the methods of diagnosis, treatment and prevention. At the same time, it must be remembered that these social evils thrive best in an environment of bad sanitation, overcrowding and malnutrition and that the general health campaign, directed towards the removal of these factors, provides a valuable supplement to the work of the special services. Moreover, an attack on modern lines forms an effective mode of education in improved sanitation and nutrition. "The modern anti-leprosy unit, with its well-equipped agricultural and industrial settlement, with

its clinics, surveys and village education, grapples with more than leprosy ; to be effective it must cover the whole range of social and economic causes which make the existence and spread of leprosy possible ". These words, which are quoted from the 1938 report of the British Empire Leprosy Relief Association, emphasise the importance of social and educational work as an essential part of the preventive campaign.

In India, the task is so great that official and voluntary efforts have so far touched only the fringe of the problem. The campaign has, however, been organised on sound lines and all organisations taking part did good work during the year. The Indian Council of the British Empire Leprosy Relief Association along with its provincial branches continued to develop its programme. Visits were paid by a full-time officer of the Association to Chhatarpur State in Central India ; Marwar State in Rajputana ; Ambala, Taran Taran, Palampur and Dharamsala in the Punjab ; Almora, Garhwal, Rae Bareilly, Moradabad, Lucknow, Benares and Cawnpore in the United Provinces ; Malegaon in Nasik district of Bombay Presidency ; and Cuttack and Sambalpur in Orissa. In most of these areas sample surveys were carried out, a number of clinics were visited and recommendations were made in respect of development of leprosy relief work. It is reported that this officer's work in different provinces " has indicated that the people are becoming more sympathetic and mindful towards the leprosy problem."

The growing appreciation by the medical profession of the leprosy problem is evidenced by the fact that a number of applicants for the two weeks' special course of instruction held at Calcutta in November 1937 had to be refused admission. It has since been decided to make the training at Calcutta a specialised course for medical men already engaged in leprosy work, whilst suitable instruction for other medical men would be provided at different provincial headquarters. For some time past, increased provision of facilities for treatment has been the concern of all anti-leprosy organisations and, although the number of clinics in existence still falls far short of actual requirements, progress continues to be made in this direction in different parts of the country. " The new provincial Governments have put the development of public health work in a prominent place in their programme and the result has been that, in several provinces, there is increased financial support for anti-leprosy activities and, in various parts of India, schemes for the development of such activities are under consideration or have been adopted ".*

Research has always formed a prominent part of the programme of work of the Indian Council of the British Empire Leprosy Relief Association. The following paragraphs quoted from the Association's report for 1937 summarise the research work carried out during that year.

" Research work has been carried on, as in previous years, at Calcutta in co-operation with the School of Tropical Medicine and the Indian Research Fund Association under the direction of Dr. Lowe, assisted by a staff of clinical, pathological, bacteriological and chemical workers most of whom are paid by the British Empire Leprosy Relief Association ".

" Diagnostic Clinic.—During the year, 1,808 new patients attended for diagnosis :—
Diagnosed as leprosy—

Neural	1,056
Cutaneous	442
	1,498

*Quoted from the 1938 report of the British Empire Leprosy Relief Association.

Suffering from other diseases	220
No diagnosis possible, kept under observation	66
Left before diagnosis made	24
Total	1,808

"*Treatment Clinic.*—(a) *Routine treatment.*—Several hundred patients have been kept under routine treatment with hydnocarpus preparations during the year. Details of the methods employed have been given in previous reports.

"(b) *Experimental Treatment.*—Experiments have been carried out in the use of various special lines of treatment of the disease itself or of certain of its symptoms. A highly iodised proprietary chaulmoogra preparation was tried but owing to its irritant properties it had to be discontinued. Total excision of small single lesions was carried out in some cases, with subsequent observation. In some cases relapse was seen. Since in some allergic conditions injections of peptone were recommended, a trial was made in cases of leprosy in which allergy might have been causing some of the manifestations. Some interesting results were obtained. Further work was done on the use of cobra venom in leprosy neuritis with good results in a proportion of the cases. Further studies were made of the use of hydnocarpus injections around trophic ulcers and around the nerve supplying the affected part; good results were obtained in some cases.

"*Observation Clinic.*—Many cases were kept under observation without treatment. These included spontaneously arrested or inactive cases, cases showing arrest after treatment, cases in which the diagnosis was uncertain and cases in which excision of single small lesions was carried out. Some arrested cases have been under observation without relapse for six years. These were all cases of neural leprosy.

"*Other Clinical Work.*—Observations carried out during the year in India and in Malaya showed that the clinical manifestations of leprosy appeared to differ considerably in different cases not only in different countries but even in different parts of India. The most severe forms of leprosy occurred amongst the Chinese and the mildest amongst Indians. This fact might help to explain the different opinions regarding leprosy expressed by workers in different countries.

"*Pathological Work.*—Clinical and pathological studies of the lesions of patients at the School of Tropical Medicine were continued. Previous studies in this connection showed the great frequency of the occurrence of the so-called 'tuberculoid' type of lesion and the clinical and pathological features of this type of leprosy are now fairly well understood. From studies made by other workers and to a limited extent by ourselves in other countries it is now becoming clear that this type of leprosy, although seen in all countries occurs much more commonly and markedly in certain races of mankind than in others and it is probably commonest of all in the north east part of India.

"Considerable difference of opinion has existed among workers in different countries regarding the place of this type of leprosy in the evolution of the disease, most workers being of the definite opinion that tuberculoid leprosy does not develop into the more well-known nodular type. This question, has, therefore, been closely studied during the last few months and the clinical and pathological studies have shown that the change from the relatively mild tuberculoid to the more severe nodular type of leprosy occurs not infrequently. This is important in making a prognosis.

"An attempt to study the infection of bone marrow in leprosy by means of sternal puncture was made in 50 cases. It has been found that when bacilli are present in large numbers in the skin, they are often but not always present in the bone marrow.

"*Bacteriological Work.*—Further intensive attempts to cultivate *M. leprae* and *M. Leprae muris* were made during the year. The methods used included the use of special artificial media with and without special gaseous environment and many different modifications of tissue culture. Approximately 2,500 media in tubes were used and about 1,000 pieces of culture tissues were seeded with lepra bacilli. In none of these experiments was conclusive evidence of multiplication of bacilli obtained nor has any conclusive evidence been obtained of the value of special gaseous environments as have been recommended by certain American workers. In many of the primary culture tubes both of artificial media and of tissue culture media, appearances suggesting multiplication were observed microscopically but all attempts to produce similar appearances in sub-cultures failed. Bacilli persisted in large numbers for a considerable time but multiplied very slowly or not at all. Perhaps the least discouraging results were obtained by seeding cultures of leucocytes and of bone marrow.

"Biochemistry.—The biochemical part of the work was severely handicapped by the long absence of the Chemist from illness. Some work was, however, done on the chemical and physical properties of hydriocarpus oil and a paper on the subject was published. Work on the diffusible and non-diffusible calcium and the cholesterol content of the blood in various forms of leprosy was resumed.

"Rat Leprosy.—Experiments were made on the transmission of rat leprosy by the intranasal route and confirmation was obtained of Wayson's finding that a generalised rat leprosy could be produced by instilling into the nostrils of healthy rats a few drops of the emulsion containing rat leprosy bacilli.

"Complement Fixation Test in Leprosy.—The Complement Fixation Test was studied in view of the interesting results reported in leprosy from the use of this test with antigen prepared from the tubercle bacillus according to the technique of Witebsky, Kligenstein and Kuhn. The test was carried out in 12 cases of nerve leprosy, 7 cases of non-leprosy skin conditions and in one case of syphilis. In leprosy the test was positive in 8 cases, negative in two, doubtful in one, and in one case the serum was anti-complementary. In the non-leprosy skin diseases the test was positive in two and negative in four; in one case the serum was anti-complementary. The single case of syphilis gave negative result."

Yaws.

26. The statement made in last year's report that yaws was to be met only in certain parts of Assam and Burma, requires amendment. Information supplied by Directors of Public Health indicates that this disease exists throughout a belt of territory in Central India consisting of parts of the Central Provinces, Orissa and the states of Hyderabad and Bastar; the Chittagong Hill tracts in Bengal are also affected. In these areas, the disease seems to be almost entirely confined to the primitive tribes, other communities living side by side with these folk remaining more or less free. Personal contact and prolonged intimate association appear to be essential for the spread of the disease and this may explain why infection is so rarely transmitted from one community to another. The disease affects both sexes and no age is exempt, but its incidence is stated to be higher among males than among females and higher among children than among adults.

In the Central Provinces, the disease is prevalent in the forest tracts of the districts of Bilaspur and Chanda. The affected areas, which border on the Nizam's Dominions and Bastar State, are stated to have a damp and warm climate.

Yaws is widely prevalent in Bastar State and although most of the cases occur among the primitive tribes, the infection has spread to some extent among other communities. The Chief Medical Officer of the State estimates that the incubation period is usually about four weeks but that it may be longer. He states, "The primary lesion, which is by no means always demonstrable, is a granuloma or papule at the site of inoculation, which may persist for months. It is invariably extragenital and may occur on any part of the body. The most common sites are the anal cleft, the groins and the axillae, face, arms and legs. These lesions grow and in the secondary stage become covered by yellowish secretion and if there are any adjacent papules they may coalesce and form large masses. The skin covering the papule now desquamates and leaves an exposed reddish warty-like surface with a close resemblance to a raspberry. Constitutional symptoms are as a rule mild in the primary stage and may go unnoticed, but in the secondary stage there is irregular intermittent fever and pains in the bones and joints which are worse at night".

"The tertiary stage is only seen in old standing cases with lesions such as periostitis, arthritis, teno-synovitis, caries of bones and ulcerations of the palate and mouth. Tubercles may also develop in the soles of the feet and give rise

to clavus or crab yaws. Bony lesions may involve the face, arms, feet and long bones. Periosteal nodes resembling gummata may form and I have seen a rarefying osteitis leading to spontaneous fracture."

A scheme of medical relief has been organised in Bastar State and, although it was not easy to persuade these primitive people to accept Western methods, by the end of 1938 nearly 51,500 persons had been treated. Treatment clinics have been opened in every medical institution of the State, whilst travelling dispensaries carry medical aid to more remote regions. During the past three years no relapse has been noted among those who have undergone the complete course of treatment, but, with the disappearance of all obvious signs and symptoms after the first two or three injections, it is difficult to persuade the patients to return for the full course.

In Madras Presidency, isolated groups of cases were reported from the districts of Madura, Malabar and Kurnool and from the municipalities of Tirupur, Tuticorin, Coonoor and Coimbatore.

The Director of Public Health, Assam, reports that yaws must have been prevalent in the province in a mild form for the past fifty years and that during the last ten years, it appears to have been spreading. The disease is widely prevalent in the districts of Kamrup, Nowgong, Goalpara and Garo Hills, while a few cases occur in Darrang, Cachar and Sibsagar districts also. The disease appears in low-lying areas, particularly at the foot of the hills, and the largest number of cases occurs during the rainy season. The people of Tibeto-Bhutan stock living in the low hills of the Assam valley, the Mikirs, Lalungs, Kacharis, Rabhas and Garos are stated to be particularly susceptible to the infection while the Assamese of the plains and Muhammadans appear to be immune. A total of 2,607 cases was treated in Public Health Department and Local Board dispensaries during 1937. Most of the cases were adults, although many of them gave a history of infection in childhood.

In Bihar the Director of Public Health reported that the disease was prevalent only in the Protappur *thana* of Hazaribagh district. The Medical Officer in charge of the dispensary at Protappur stated that the disease was widely distributed through the *thana*, that all the cases he had seen were among Hindus, that high caste Hindus generally escaped the disease and that, among the lower classes, the infection was fairly common. He had so far treated 26 cases at his dispensary and, in regard to treatment, he stated that arsenical preparations were excellent, two or three injections being sufficient to dry up the sores and make all pain to disappear. Bismuth salts, on the other hand, were not so effective unless their administration was combined with that of arsenical preparations.

In Orissa, the disease is prevalent only in the Agency areas of Ganjam and Koraput districts and is mostly confined to the hill tribes known as 'Koyas', the disease itself being called locally 'koya disease'. The Telegus living side by side are relatively free from infection. Suitable measures are being taken to provide medical aid.

In Bengal, cases have been reported from Chittagong Hill tracts, the disease being confined to hill men. The Civil Surgeon reports that Bengalees living side by side with these hill men have never been known to contract the infection. The disease is stated to be more in evidence during the rains than at other seasons. Treatment has been made available to the people at medical institutions in the area but a scheme is under consideration by which medical aid will be brought nearer their homes.

In the Nizam's Dominions, the prevalence of yaws is stated to be " confined to the jungle tract known as ' Kurva Pati ', which extends from Wadra taluq, passes through Paloncha, Narsimpet and Mulug taluks of Warangal district to the Manthani taluk of Karimnagar district ".

Kala-Azar.

27. The following statement gives the numbers of kala-azar cases treated and deaths in hospitals and dispensaries and gives some general idea of the prevalence of the disease in different parts of the country :—

TABLE II (ix).

	Cases.	Deaths.
N.-W. F. P.	..	..
Punjab	28	..
Delhi	36	..
United Provinces	701	9
Bihar	91,942	316
Orissa	63	2
Bengal.	103,148	398
Central Provinces	7	..
Bombay	20	..
Sind	..	..
Madras	2,517	19
Coorg	..	..
Assam	6,712	66

Kala-azar continued to be a rare disease in the provinces of North-West Frontier Province, Punjab, Delhi, Orissa, Central Provinces, Bombay, Sind and Coorg. In the United Provinces, this disease accounted for 184 deaths as against 87 during the previous year. The Director of Public Health considers these figures as under-estimates of the actual incidence. In Bihar, the incidence of kala-azar has steadily increased during the past few years, as is evidenced by the fact that the voluntary attendance of patients suffering from this disease at medical institutions rose from 57,400 in 1935 to 68,253 in 1936 and 91,942 in 1937. The Inspector General of Civil Hospitals expresses the opinion that the disease has been endemic in that area of Bihar which lies north of the Ganges " for at least some decades of years " and that the recent increase must be declared to be an endemic ' flare-up '. Infection is confined mainly to the rural population in the endemic area, although town residents are by no means exempt. Some idea of the distribution of the disease in this province may be

obtained from the following three tables which are reproduced from "A note on Kala-azar in Bihar with suggestions for an extended Kala-Azar Policy for Bihar" by the Inspector General of Civil Hospital :—

TABLE II (x).

Group A.—Districts lying between Nepal and the North Bank of the Ganges (five districts with about half of Bhagalpur and Monghyr).

Districts.	Population.	Area in square miles.	Total attendances (in and out patients.)	Kala-azar cases in 1937.		
				Total (actuals).	Rate per 1,000 population.	Rate per 1,000 patients attending for all causes.
1	2	3	4	5	6	7
Purnea	2,186,543	4,956	501,694	22,012	10.07	43.87
Darbhanga	3,166,094	3,665	850,523	27,244	8.60	32.03
Bhagalpur (north of river)	1,235,144	..	176,259	5,788	5.33	32.83
Muzaffarpur	2,941,025	3,003	602,992	15,211	5.17	25.04
Saran	2,486,468	2,683	439,772	7,969	3.25	1.81
Monghyr (north of river)	1,108,503	..	199,445	2,040	1.84	10.22
Champaran	2,145,687	3,531	496,086	3,697	1.72	7.45
Total	15,269,464	..	3,266,771	83,961	5.49	25.70

Group B.—Districts bordering the south bank of the Ganges.

Districts.	Population.	Area in square miles.	Total attendances (in and out patients).	Kala-azar cases in 1937.		
				Total (actuals).	Rate per 1,000 population.	Rate per 1,000 patients attending for all causes.
1	2	3	4	5	6	7
Bhagalpur (south of river)	999,488	..	118,641	1,482	3.52	12.49
Patna	1,846,474	2,074	693,568	2,992	1.60	4.31
Santal Parganas	2,051,472	5,466	267,636	1,028	0.50	3.84
Monghyr (south of river)	1,178,651	..	223,387	493	0.41	2.20
Shahabad	1,993,489	4,372	537,516	1,176	0.60	2.18
Total	8,069,574	..	1,840,748	7,171	0.88	3.89

Group C.—Districts not bordering the Ganges (Gaya district and the Chota Nagpur Division—six districts).

Districts.	Population.	Area in square miles.	Total attendances (in and out patients).	Kala-Azar cases in 1937.		
				Total (actuals).	Rate per 1,000 population.	Rate per 1,000 patients.
1	2	3	4	5	6	7
Hazarihagh . . .	1,517,357	6,988	249,224	436	0.28	1.74
Gaya	2,388,462	4,712	665,952	183	0.08	0.27
Ranchi	1,567,149	7,102	194,792	78	0.05	0.42
Singhbhum	929,802	3,879	618,922	37	0.04	0.05
Palamau	818,736	4,916	199,439	32	0.04	0.16
Manbhum	1,810,890	4,147	366,070	23	0.01	0.86
Total	9,032,396	..	2,294,399	789	0.09	0.34

NOTE.—The districts are arranged in order of the kala-azar cases per 1,000 of population. The rate of kala-azar cases per 1,000 patients attending the hospitals for all diseases is also given together with the actual number of cases, the population, total attendances for all diseases and district area.

Although these are only records of treated cases, it is clear that in those districts lying to the north of the Ganges a much higher incidence occurs. Fortunately, as has been pointed out by the Inspector General of Civil Hospitals, we have in the improved preparations of organic antimony a powerful weapon against the disease, one which can convert a 95 per cent. mortality amongst untreated cases into a similarly high rate of recovery amongst those who undergo treatment. Moreover, "since the common means of spread of kala-azar from one person to another is at present unproved the only practical way to prevent the spread of kala-azar is an effective campaign of treatment". The treatment campaign, if it is to be successful, must be made free to the villagers and should be made available as near as possible to their homes.

In regard to kala-azar research, a long record of successful achievement stands to India's credit. Whilst the causal organism was discovered by Indian workers and effective treatment for the disease was also elaborated in this country, no definite proof of the common method of spread of infection has yet been made, although available evidence seems to incriminate the sand-fly as the responsible vector.

The increased incidence of kala-azar in Bihar, whilst bringing prominently to the notice of the provincial authorities the necessity for an effective campaign against the disease, has emphasised the importance of renewed study of its epidemiology and, in particular, its mode of transmission. At the moment attempts are being made to organise an enquiry under the joint auspices of the Governments of Bengal, Assam and Bihar and the Indian Research Fund Association. It is to be hoped that this new enquiry will result in the final elucidation of the factors involved in the transmission of the disease, on which alone a scientific preventive campaign can be based.

In Bengal Presidency the total number of deaths increased from 21,161 in 1936 to 21,227 during the year under review, although a small decrease took place in urban areas.

The number of kala-azar patients treated in Assam increased from 10,587 in 1936 to 12,051 during the year under review and recorded deaths also rose from 753 to 1,057. These increases were shared by Sylhet, Goalpara, Nowgong and Sibsagar districts. As compared with the decennial average (of 1927—1936), however, the number treated during 1937 decreased by about 29 per cent. and deaths by 12 per cent. Table II (xi) shows the distribution of the disease in this province.

TABLE II (xi).

Districts.	1937.		Decennial mean (1927—1936).	
	No. of cases.	No. of deaths.	No. of cases.	No. of deaths.
Cachar	445	4	441	4
Sylhet	3,672	207	6,197	313
Goalpara	2,046	135	1,651	122
Kamrup	918	77	2,538	183
Darrang	514	256	1,340	193
Nowgong	2,317	196	2,014	172
Sibsagar	1,396	126	1,375	87
Lakhimpur	2	..	16	2
Khasi and Jaintia Hills	..	5	13	2
Naga Hills	15	..	10	..
Lushai Hills	..	..	1	..
Garó Hills	717	51	1,308	101
Sadiya Frontier Tract	2	..	2	1
Manipur State	7	..	48	..
Total	12,051	1,057	16,954	1,180

Intensive and detailed surveys were continued in all districts in order to detect fresh cases and to bring them under treatment as early as possible. A sub-assistant surgeon was deputed to Cachar district to carry out a kala-azar survey. The sub-assistant surgeons in charge of hospitals and dispensaries also surveyed 514 villages during the year.

Relapsing Fever.

28. In last year's report it was stated that the recorded figures in certain provinces exaggerated the incidence of relapsing fever. In Bengal, for instance, following the issue of instructions by the Public Health Department, the number of recorded deaths from this disease fell from 5,173 during 1933 and 2,720 during 1934 to eight in 1935, seven in 1936 and two during the year under review. The Director of Public Health, Central Provinces, has also reported that, although 437 deaths were registered as due to relapsing fever, none of these deaths was medically verified or confirmed by microscopical examination. In the United Provinces, 227 deaths were attributed to this cause, but the Director of Public Health does not consider that these have been correctly diagnosed. As regards other provinces, in the Punjab only 71 deaths were recorded, all in rural areas where registration is more unsatisfactory than in urban areas. In the municipalities of Bihar and Madras Presidency only one death was recorded in each group. In Assam, from 13 towns, six deaths were reported, whilst in Bombay Presidency only one urban death was reported.

Influenza.

29. Since the great pandemic of influenza in 1918-19, influenza epidemics in India have been of a much milder character. Complete mortality figures for British India are not to be had, but available information goes to show that there was no serious outbreak of this disease during 1937. In Assam, the number of deaths increased from 62 in 1936 to 481 during the year under review. In other provinces, recorded deaths numbered 2,422 in Bengal, 520 in the United Provinces, 265 in the Central Provinces, 153 in Bombay Presidency, 24 in the Punjab and 188, 58, 36, and one in the municipalities of Madras Presidency, Bihar, Orissa and N.-W. F. P., respectively ; no death was recorded in Sind.

Table II (*xii*) gives the numbers of cases treated in hospitals and dispensaries during 1937 in the provinces, along with the numbers of deaths. The low case mortality is suggestive of the mild form of the disease.

TABLE II (*xii*).

	Number of cases.	Number of deaths.
N.-W. F. P.	3,762	2
Punjab	31,618	4
Delhi	4,223	..
U. P.	96,953	24
Bihar	121,957	11
Orissa	14,860	17
Bengal.	261,393	41
C. P.	51,335	9
Bombay	84,431	15
Sind	9,997	1
Madras	328,192	77
Coorg	10,713	..
Assam	37,278	3
Baluchistan	661	..

Goitre.

30. As regards the prevalence of endemic goitre, Sir Robert McCarrison has stated that it is "in such localities as Himalayan India and the more remote parts of other mountaineous regions, where old habits and customs prevail and to which the amenities of modern civilization have not yet penetrated, that the classical type of endemic goitre is likely to be encountered in a state of aetiological purity." In these regions, about 35 years ago, "persons with large pendulous goitres, and sufferers from cretinism, deaf-mutism and idiocy, were commonly encountered", but, during recent years, these grosser manifestations of goitre have become less common, although the geographical distribution of the disease has widened.

Figures taken from the hospitals and dispensaries reports of the different provinces for the year 1937 give some idea of the relative incidence of the disease. In the United Provinces, 94,062 cases of goitre were treated in hospitals and dispensaries. Of these, 17,998 admissions were recorded in Gonda district, 13,945 in Bahraich district and 11,253 in Gorakhpur district. In Bihar, cases treated numbered 91,298, of which 36,006 were recorded in Champaran district, 16,516 in Saran district and 13,270 in Darbhanga. In Assam, goitre accounted for 41,151 admissions, about one-third of this total being recorded in Goalpara district alone. In the medical institutions of the

Punjab and Bengal, over 33,000 cases of goitre were treated. In the former, approximately one-third belonged to Kangra district. Other provinces recorded much smaller numbers, 2,304 in N.-W. F. P., 664 in Madras, 286 in Bombay, 166 in the C. P., 73 in Sind and 71 in Orissa.

Dracontiasis.

31. Guinea-worm infection is widespread in certain restricted parts of India, but even in these areas it is mostly confined to villages and towns where the water-supply is unsatisfactory. The infection is not found in well-watered areas like Bengal and in regions with abundant rainfall such as the West Coast of Madras Presidency, Cochin and Travancore; on the other hand, a low or moderate rainfall, rocky soil and a scanty water-supply appear to favour its appearance. Study of the average annual rainfall in different infected areas shows that most endemic villages have a rainfall between 20 and 30 inches and that infection is generally absent in areas receiving over 40 inches or under 10 inches of rain per annum. The distribution of guinea-worm infection in India has been given in the health bulletin entitled "Dracontiasis or Guinea-worm Disease", by Drs. P. A. Maplestone and S. Sundar Rao, and the following details have been taken from that publication:—

The disease is mainly confined to the western half of India, its incidence being fairly heavy in Rajputana and Central Deccan. The provinces of Assam, Bengal, Bihar, Orissa, United Provinces and Sind are practically free. In the North-West Frontier Province, the disease is widely prevalent in the districts of Kohat, Dera Ismail Khan and Bannu. In the Punjab, it is confined to the districts of Hissar, Hoshiarpur, Ferozepore, Gujrat, Sargoda, Campbellpur, Lyallpur, Mianwali, Dera Ghazi Khan and Muzaffargarh, the infection not being so heavy as in some other provinces. In Rajputana and Central India, most of the States contain heavily infected areas but the Rajputana desert is free.

In the Central Provinces, the eastern districts are practically free, but 10 districts adjacent to endemic areas in Central India, Bombay Presidency and Nizam's Dominions are moderately infected. In Bombay Presidency, the sea coast area south of Bombay is free, but Kathiawar, Khandesh, Surat, Ahmednagar, Thana, Colaba, Poona, Sholapur, Bijapur and Dharwar are heavily infected. In the Nizam's Dominions, the disease is present in nine out of sixteen districts.

In Madras Presidency, infection is present in all districts of the Coramandel Coast up to Ganjam; in the Ceded Districts; in Salem, Arcot, Madura and Ramnad; and in Pudukotta State. The districts of Tanjore, Trichinopoly, Coimbatore and the Nilgiris are comparatively free; the West Coast shows no infection. In Mysore State only the northernmost district of Chitaldrug is infected.

Guinea-worm is not usually a fatal condition but it is responsible for a large amount of suffering and incapacitation. "In endemic areas, agricultural operations and constructional work have often been seriously interfered with owing to most of the labourers being incapacitated by the disease and outside labour has had to be imported." As the infection is almost wholly confined to rural areas, medical aid is seldom available to those who have become infected and incapacity may last for months and may even result in permanent deformity. The economic loss caused by the disease must be considerable.

Preventive measures are, however, comparatively simple, the conversion of step-wells into draw-wells being the most effective and the method of choice. "Several villages in Mysore, Madras and the Nizam's Dominions have been freed

NR 6
DISTRIBUTION OF GUINEA-WORM INFECTION IN INDIA.



Infected areas... 

from the infection by the gradual abolition of step-wells and the introduction of draw-wells with parapet walls. Again, in Damoh (Central Provinces), which was formerly an endemic centre, the infection completely disappeared after the introduction of a pipe-borne water-supply in 1913."

Infected water-supplies can be purified in different ways. An efficient and cheap substance is lime, which is usually readily available. A dose of 60 grains of lime to a gallon of water is sufficient to kill the cyclops which are the intermediate hosts for the worm embryos and through whose ingestion the infection generally gains entry into man. Moorthy and Sweet have suggested a biological method of control by the introduction of barbel fish (*Barbus puckelli*) which feed voraciously on cyclops and on guinea-worm larvae. This method has been used successfully by them for eliminating guinea-worm infection in Chitaldrug district in Mysore. For individual prophylaxis, the drinking water should be boiled or strained through a piece of fine cloth.

Although these preventive measures are relatively simple, they have not received the attention they deserve from health authorities. By teaching the people how to avoid infection and by improvement of rural water-supplies guinea worm infection can easily be controlled and eventually eradicated. The resulting better health and increased earning capacity of the villagers give ample return for the expense involved in a preventive campaign.

Diphtheria.

32. Recorded figures for this disease are as usual of doubtful accuracy and do not give any accurate indication of its real incidence. Available records show that two deaths were registered in the municipal towns of the North-West Frontier Province, two in those of Bihar and Orissa and four in the towns of Ajmer-Merwara. In the Punjab, 151 deaths were registered as against 106 during 1936; these included 56 in towns and 95 in rural areas. Delhi Province recorded 14 deaths and United Provinces 79. Of the 79 recorded in Bombay Presidency 75 occurred in rural areas and four in towns; similarly in Central Provinces, out of a total of 64 deaths, 47 were recorded in rural circles and 17 in towns. In Bengal Presidency a total of 550 deaths was recorded as against 410 in 1936; these included 382 in rural areas, 111 in Calcutta City and 57 in other towns. In Sind, 36 deaths were recorded, of which half occurred in Karachi City. In the latter area, 167 cases occurred which gives a case mortality rate of 10.78 per cent.; preventive measures included examination of throat swabs from all contacts, immunisation of all positive contacts with toxoid anti-toxin mixture and a campaign of immunisation in respect of school children. Milk samples were examined but all proved negative.

The numbers of cases treated in hospitals and dispensaries during the year under review are shown in Table II (xiii); these give some general idea of the relative incidence of the disease in different parts of the country.

TABLE II (xiii).

Province.	No. of cases treated.	Province.	No. of cases treated.
N.-W. F. P.	103	Bombay	275
Punjab	327	Sind	220
U. P.	527	Madras	1,023
Bihar	915	Coorg	2
Orissa	48	Assam	36
Bengal	1,695	Baluchistan	2
C. P.	697		

Typhus.

33. The numbers of cases of typhus treated in hospitals and dispensaries in the different provinces during 1937 and figures for deaths are given in the following statement :—

TABLE II (xiv).

Cases and deaths from typhus recorded in hospitals and dispensaries in 1937.

Province.	Louse.		Tick.		Unknown vector.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
N.-W. F. P.	1	1	64	..	11	..
Punjab	126	1	1	..	212	10
U. P.	121	1	30	5	414	2
Bihar	101	..	36	..	112	6
Orissa	84	..	3	..	12	..
Bengal.	304	2	30	..	358	1
C. P.	44	1	5	..	25	1
Bombay	396	4	..	..	42	1
Sind	6	..	..	..	3	..
Madras	220	..	56	..	1,793	..
Coorg	..	..	..	..	..	..
Assam	..	..	..	..	..	..

Cerebrospinal meningitis.

34. During 1937 a further reduction in the incidence of cerebrospinal fever occurred in several provinces. In the N.-W. F. Province, only 22 cases and 11 deaths were recorded as against 28 cases and 13 deaths in 1936. Cases were reported from the districts of Peshawar, Bannu, Dera Ismail Khan and Malakand Agency. In the Punjab, 197 cases and 73 deaths were recorded as compared with 205 and 91 in 1936. In Delhi Province, of 41 deaths recorded, 33 were reported from Delhi City and four each from New Delhi and Notified Area Civil Lines ; other areas remained free. In Ajmer-Merwara only six deaths were reported from urban areas.

The incidence of cerebrospinal fever in the United Provinces showed a further decrease, 158 deaths being recorded as against 236 in 1936 and 756 in 1935. Of this total, 100 were reported from urban and 58 from rural areas. The majority of cases occurred in persons between five and 35 years of age ; children under one year and persons over 50 years were least affected. As regards communities, no difference in susceptibility was apparent but females were comparatively less affected than males. Wherever possible, cases were isolated and treated in infectious diseases or general hospitals and special arrangements were made for lumbar puncture and for the administration of repeated injections of anti-meningococcus serum.

In Bihar, the incidence of cerebrospinal fever showed a considerable increase during 1937, the number of cases treated in hospitals and dispensaries being 363 as against 17 in 1936 and 55 in 1935. Its incidence was at its maximum in May and December. The districts of Palamau, Shahabad, Patna and Manbhum were worst affected but several others recorded sporadic outbreaks.

In Bengal, 938 deaths from cerebrospinal fever were recorded during 1937, an increase of 28 over the previous year. Of 398 urban deaths, 369 were recorded in Calcutta. Rural deaths rose from 450 in 1936 to 540 in 1937.

In Assam, 27 cases with four deaths were recorded in Naga Hills, six and four in Sibsagar district and two deaths in Cachar district. In Manipur State, a relatively large outbreak occurred, 218 deaths being recorded as against 95 in 1936.

In the Province of Orissa, 216 cases were treated in hospitals and dispensaries during 1937 as against 55 in 1936. The Director of Public Health expressed the opinion that bad housing conditions were largely responsible for the increased incidence.

In the Central Provinces, 49 deaths were recorded as against 68 in 1936. The districts affected were Nagpur (25), Akola (11), Buldana (5), Chanda, Balaghat and Amraoti (2 each), Nimar and Bhandara (1 each). Temporary regulations, under the Epidemic Diseases Act, were brought into force in the towns of Nagpur, Amraoti, Khandwa, Burhanpur and Akola.

No deaths from this disease were recorded in the municipal towns of Madras Presidency; no information was available for rural areas.

In Bombay Presidency, 227 deaths were registered during 1937 as against 407 in 1936. Bombay City again was worst affected, 242 attacks and 154 deaths being recorded as compared with 353 attacks and 228 deaths during the previous year. Since the severe epidemic of 1933-34, infection has continued to smoulder in Ahmedabad town, although a steady decrease in the numbers of attacks and deaths has taken place. During the year under review 106 attacks and 57 deaths were registered in this town as against 170 cases and 96 deaths in 1936. In other parts of the province, only sporadic cases occurred.

In Sind, 25 attacks and 15 deaths were reported during the year as compared with 18 attacks and 11 deaths in 1936.

Trachoma.

35. Trachoma is widely prevalent in many parts of India, particularly in the north. Sir H. T. Holland* gives the following description of this disease in India:—"A recent census was taken of trachoma in the various provinces of India and the returns are very interesting. In my own part of the world, Baluchistan, and also in the Punjab and the N.-W. F. P., the returns say that trachoma is universal. In Assam and Burma, 75 per cent. of all eye cases are trachomas, in Agra and Oudh 60 per cent., in Bombay only 14.5 per cent. of eye cases treated at the Bombay Ophthalmic Hospital are trachomas. In Delhi, the majority are trachomas. Trachoma is nothing like so common in the South of India, though at the Madras Ophthalmic Hospital in 1933, 1,149 cases of trachoma were discharged as healed."

In interpreting these figures, it must be recognised that, as Col. R. E. Wright, I.M.S., points out, even expert ophthalmologists are not completely agreed as to what constitutes a clinical case of trachoma. These figures, which relate to medical institutions scattered all over the country, must therefore contain some margin of error. As a general statement, however, they provide a useful picture of the distribution of the disease. Sir H. T. Holland adds that "there are many cases of mild trachoma, which are not only amenable to treatment, but which will eventually clear up without treatment". Even so, trachoma constitutes a serious problem in those areas where it is widely prevalent and a neglected case may eventually end in blindness with all the social and economic disabilities which that calamity entails. In last year's report, it was stated that, amongst causes of rejection among recruits for the Indian Army, trachoma ranked as perhaps the most important. The necessity for a wide preventive campaign against this disease is therefore apparent. Education of the people regarding its infectious nature and its common modes of

*"Trachoma", Journal of the Christian Medical Association of India, Burma and Ceylon, May 1938.

transmission is as important as the provision of adequate facilities for treatment.

The organisation of an effective campaign is, however, by no means easy. As Col. Wright pointed out in a communication made to the meeting of the International Association for the prevention of Blindness and the International Organisation against Trachoma in April 1935, trachoma-like or 'trachomatoid' affections of the conjunctiva, as he calls them, are easily confounded with early trachoma and are often treated with the strong irritants used against trachoma. He has graphically described the mischief done by such vigorous treatment. "In fact, if any one goes round the world as I have done, observing the methods employed in the various dispensaries and ophthalmic clinics in the treatment of the trachomatoid and other affections of the conjunctiva, one is left with the impression that, if some of the patients have not got trachoma when they first come to the clinic—and who is to say in the early stages whether they have or not—they will certainly be fortunate in not having either trachoma or its equivalent by the time they leave after a course of treatment". According to him such treatment "definitely ensures a larger number of serious ophthalmias in India than would otherwise be the case". On the other hand, treatment by mild methods quickly clears up most of these cases. With trachoma or trachomatoid conditions almost universally present in provinces like the N.-W. F. P., Punjab and Sind, no plan of campaign against the disease is likely to be effective until medical practitioners and rural dispensary doctors receive adequate instruction in the diagnosis and treatment of these conditions. Here again, also, a considerable expansion of the rural medical services is essential. As regards education of the people, the rural dispensary doctors can make the most substantial contribution by offering suitable advice to their patients and by securing their co-operation in spreading information on simple methods of prevention.

SECTION III.

MATERNITY AND CHILD WELFARE.

Introduction.

36. The increasing concern in respect of the serious loss of life amongst mothers and children in this country and the heightened sense of responsibility for the health and safety of these sections of the community were reflected in the decision of the Central Advisory Board of Health in 1937 to appoint a special committee to report on the whole subject of maternity and child welfare work in India. The committee completed its work within recent months and its comprehensive report has now been approved by the Board and has been issued.

The report not only makes clear the defects at present in existence in this field of activity but indicates the directions in which development is necessary. The last chapter of the report contains no less than 53 recommendations relating to administration, organisation and supervision, statistics, the maternity, infant and child welfare services, training of staff and legislation. It is to be hoped that all interested in the subject and particularly those concerned with official activities in the maternity and child welfare field will study the whole report with care and will give every consideration to its recommendations when planning new schemes or extensions of those already in existence. The report should prove a useful guide both to official and voluntary workers in this country.

Among the more outstanding recommendations, the report stressed the importance of the appointment of a properly qualified and experienced woman medical officer in each province, if maternity and child welfare work was to be properly organised. There can be no question that the duty of organising and supervising this branch of public health work is one which is peculiarly the function of medical women, who alone can understand and make free contact with the mothers of India's children.

Closely linked with this recommendation is another which refers to the employment of women doctors in the management and supervision of municipal and other local maternity and child welfare schemes. For the benefit of the mothers and children requiring advice and assistance, a woman doctor's services are essential, because there are limitations to the employment of non-medical women in the welfare centres. Women doctors before appointment to such posts should have undergone special training in order that the schemes under their charge may develop on suitable lines both as regards the control of health visitors and the advice given to the mothers attending the centres. It is impossible for a woman doctor without special training to carry out these duties efficiently, *e.g.*, in the detection of early and easily corrected departures from health.

As regards special training, although a diploma course in maternity and child welfare has been provided in the All-India Institute of Hygiene and Public Health, Calcutta, it is regrettable that so far few medical women have seen fit to take that course.

Attention may also be drawn to another recommendation of the committee which refers to the desirability of providing a system of grants-in-aid from Government sources, not only because these stimulate local bodies to improve their services but because they also give official public health departments a suitable measure of control and supervision over the work undertaken by these authorities. Without such grants, the only pressure that can be exercised upon local bodies is that of persuasion, whilst lack of skilled guidance has frequently resulted in much waste of money and effort. No more useful or advantageous method of ensuring the correct development of this public health activity can be found than by grants-in-aid made on the condition that certain standards of efficiency are maintained.

Further evidence of the new regard now being paid to the place of the mother and her child, in relation to national well-being and the improvement of national health, is to be found in the appointment of an Advisory Committee of the Indian Research Fund Association on maternal mortality and morbidity. That committee has been able to convince the Association that further research on this subject is essential and two enquiries were financed during 1937 and, it may be added, have been continued during 1938. These enquiries are of considerable importance and their findings are discussed in later paragraphs of this section of the report.

A further advance has been made possible by the recent passing of a number of provincial Nurses', Midwives', and Health Visitors' Registration Acts, designed to secure the registration and better training of midwives. A number of Nursing Councils established under these Acts have already drawn up rules regulating the courses of instruction for midwives. Courses of training have been extended from 12 to 18 months in several provinces and due regard has also been paid to the educational qualifications of candidates for admission to the profession. The work of these councils should in due course result in the provision of better and more extensive midwifery services.

The training of medical students in obstetrics has also been under review during the year. In April, 1937, the Medical Council of India, convinced of the necessity for improvement in the teaching of this subject, issued a pamphlet entitled "Notes on the teaching of midwifery in British Indian Universities". This pamphlet has indicated that much requires to be done before the teaching of obstetrics in medical colleges can be regarded as satisfactory.

A sound training in pre-natal and post-natal care is essential both for medical students and midwives. For this purpose, well-organised pre-natal and post-natal clinics should be provided in all hospitals training students and midwives and attendance at these clinics should be included in the courses of instruction in midwifery for medical students. Similarly with midwives, the existing courses of instruction should be expanded to include a specified number of hours' attendance at these clinics. Only in this way can the students and midwives be brought to realise the preventive aspects of this branch of medicine.

Maternal Mortality.

37. Rates of maternal mortality from the provinces show wide variations and cannot be accepted as representing the position with any degree of accuracy. The absence of medical certification of deaths and the fact that deaths resulting from pregnancy are usually recorded under other headings, unless the cause of death is self-evident, result in even greater inaccuracy in maternal mortality figures than in other death registrations.

A maternal death for purposes of registration was previously defined as "a death occurring within 14 days of confinement". In order to bring the definition more into line with present day practice, instructions were issued in 1937 to the effect that all deaths occurring within one month of childbirth should be classified under this heading. Moreover, as mother giving birth to still-born children are equally exposed to the risks of maternity, all Directors of Public Health were asked to calculate maternal mortality rates on the combined figures of live and still-births.

Consideration of the figures of death rates for males and females in the reproductive period of life (15—40 years) shows that a consistently higher figure for females is recorded in all provinces, except Bihar [Table I (ix), page 10]. In Delhi Province, the female death rate for this age period was double that of males, 12·9 *per mille* as compared with 6·4 *per mille*. One of the reasons for this marked difference in Delhi Province probably is that a large proportion of the population of Delhi Province is urban. In many of the large cities of India, in fact, the female death rate during the reproductive period frequently is much higher than that for males; this is evidenced in the following statement which shows that in Calcutta and Lucknow the female rate is nearly three times that for males, in Bombay and Lahore about twice as high and in Madras about 35 per cent. higher than the male death rate :—

Death rates (1937).

(15—40)

	Male.	Female.
Calcutta	11·53	33·02
Bombay	7·25	13·81
Madras	11·19	15·08
Lucknow	5·61	16·15
Lahore	4·63	10·24

Whilst variations in the degree of accuracy of registration of male and female deaths may contribute to some extent to these differences, this is unlikely to be the whole explanation. Accumulating evidence seems to indicate that childbearing takes a much higher toll of life in urban than in rural areas and that the good effects of the better urban facilities may be more than outweighed by the ill-effects of over-crowding, of lack of sunshine and fresh air and of ill-balanced diets. Few reliable figures for maternal mortality are available for rural populations, but the maternal mortality rate recorded in three "Health Unit" areas in South India was only 5·0 per 1,000 total births. Registration in these areas may be taken as fairly accurate, but unfortunately conditions in these "Health Unit" areas are not typical of those of the country as a whole and it is not possible to generalise until further information has been collected over longer periods and in many different areas. In places, for example, where are to be found such conditions as hookworm infection with resulting anaemia, or osteomalacia leading to obstructed labour, the maternal mortality rate will certainly be adversely affected. It is hoped that an enquiry into the number and causes of maternal deaths, which is to be undertaken in Delhi Province, will provide some additional information of a more accurate nature. It is most desirable that enquiries of a similar kind should be carried out in as many additional areas as possible. It has been suggested that these might be undertaken by Public Health Departments, particularly through the women medical officers in charge of local maternity and child welfare schemes. There seems no reason why these women doctors should not gradually be able to throw light on the problems associated with the deaths of mothers coming under their jurisdiction. As a guide to the conduct of such enquiries a memorandum on

the subject has been prepared by a sub-committee of the maternal mortality advisory committee of the Indian Research Fund Association. In view of the importance of initiating such enquiries in as many separate areas in India as possible, the memorandum is reproduced below for the information of those interested in the subject. The schedules for the collection of information are included with other appendices of this section :—

*“ Introduction.—*Two enquiries have been carried out under the auspices of the Indian Research Fund Association into the incidence, causes and prevention of maternal mortality. These enquiries have yielded valuable information relating to the medical, hygienic and social factors influencing maternal mortality rate in two large industrial cities situated in coastal regions, but data relating to inland towns and rural areas of widely differing geological, climatic, social and health conditions are necessary before any schemes of widespread application for the control of maternal mortality can be effectively formulated. The Advisory Committee on maternal mortality under the I. R. F. A. felt that the co-operation of provincial public health departments should be solicited for obtaining this information and, with this object in view, recommended the preparation of a memorandum on the conduct of local maternal mortality enquiries for the guidance of public health and other authorities.

The ideal inquiry would include an investigation of the various factors influencing maternal mortality. Such a study would, however, be incomplete if confined to maternal deaths. The extension of the enquiry to the whole body of pregnant women in the community, during the period of investigation, would alone justify the drawing of valid inferences. Further, such a comprehensive enquiry would present the problems of maternal morbidity and incapacitation along with those of mortality. From the administrative point of view, sickness and suffering attendant on child-bearing are as important as death. An enquiry on these lines is too ambitious a project to be undertaken at present by public health departments. Further, since the investigation of factors influencing maternal deaths is of limited value in the absence of comparative data in relation to the mothers who survive, the types of enquiry presented in the memorandum are of strictly limited scope. The schedules are designed simply for the collection of more accurate information regarding the incidence and clinical causes of maternal deaths. Analysis of the schedules is expected to throw light on the defects in the existing maternity services and to indicate the directions in which expansion is desirable. A survey of the present provision for midwifery is also necessary for future planning and forms for the collection of this information are also appended.

General Considerations.

1. *Improvement of registration of deaths.*—The success of the enquiry depends largely on the completeness of registration of deaths in the area in which the investigation is being carried out. It is therefore desirable that the public health staff should devote special attention to the improvement of registration of vital statistics. Further there should be complete co-operation between the registrars and the field investigators. Medical certification of deaths is exceptional in India and reconstruction of the diagnosis has therefore to be carried out some time after death. Under the circumstances, a rapid notification of deaths by the registrar to the field worker is essential. Moreover, a detailed investigation of all cases, which are likely to have been due to maternal causes, is necessary to secure completeness of figures and all deaths of women during the child-bearing periods 10 to 50 years, should therefore be notified to the field worker. At the same time, in order to avoid the follow-up of cases not likely to be associated with maternity, the following information regarding each female death between 10 and 50 years should be recorded by the registrar and should be supplied to the investigator :—

1. Was the woman pregnant at the time of death ?
2. Did she die during labour or abortion ?
3. Did she die within three months of labour or abortion ?

Daily extracts from the death register, along with answers to the above three questions, should be sent by the registrar to the field worker in order that the latter may promptly investigate the cases.

2. *Staff.*—The field worker should preferably be a medical woman as she will generally be able to collect the information better than a man who may have to depend on second or third hand information. A sound knowledge of obstetrics is essential in order to ensure that the facts are intelligently collected and that their relative importance is properly assessed. The attitude and tact of the investigator are of importance because visiting a family in which the mother has recently died is, from the point of view of scientific investigation, no easy matter for obvious reasons.

When a woman doctor is not available a medical man may carry out the enquiry provided he has the necessary qualifications. In the absence of both, a health visitor should be able to collect a large amount of useful information and her services may be engaged for the inquiry.

It is desirable to associate an experienced obstetrician with the enquiry. The field workers should work in close association with this expert, who should discuss the completed forms with the investigators while the details are still fresh in their minds, so that, whenever necessary, additional information may be collected and modifications made in the diagnosis and in the assessment of the relative importance of the avoidable factors as found by the field workers.

3. *Selection of the population for investigation.*—Maternal mortality inquiries conducted in a few places in India have demonstrated that 20 per 1,000 live-births may be a not unreasonable rate for the country as a whole. The published vital statistics of British India show that the birth rate has kept steady at about 35 per 1,000 of the population from the beginning of the present century. As it has been estimated that the margin of error in regard to birth registration is at least 20 per cent., it is safe to assume that the real rate will not be below 40 *per mille*. On the basis of these figures the population of a community selected for maternal mortality inquiry should be about 125,000 in order to give approximately 100 maternal deaths every year for investigation. In the rural areas of a province like Bengal, such a population is likely to be spread over 400 square miles and distributed among about 800 villages. An investigation in such an area for a period of 3 or 4 years should yield information relating to about 300 to 400 maternal deaths, which is perhaps the minimum essential for statistical study. The average populations of rural health units which have been established in different parts of the country is about 40—42,000, or a third of the figure suggested above. If health units are selected for carrying out maternal mortality inquiries the period of investigation would have to extend to about 12 years in order to provide the same number of maternal deaths for study.

A point for consideration in regard to prolonged periods of investigation is whether the introduction of health services and of other social ameliorative measures is likely to vitiate the results of the enquiry by making the figures of the earlier part of the period not comparable with those of the latter part. An examination of the figures should by itself throw light on this question, a relatively rapid fall in total maternal mortality and of deaths due to specific causes like sepsis, if they should occur, rendering the figures of the two periods not comparable. However, there is no reason to anticipate that such a result would follow because an all-round improvement in the health and environmental hygiene of the rural population under investigation, on such a scale as affect the maternal mortality rate, is not likely to happen within the period.

Types of Inquiry.—Three types of enquiry are presented. They may be adopted by health authorities with suitable modifications for local conditions. No single type of investigation is likely to be suitable for universal adoption in view of wide differences in the organisation of health services in different parts of India.

Type I.

Type I is an enquiry on purely statistical lines which can be undertaken in almost any area. A medical investigator is necessary together with prompt notification of deaths due to childbearing by the registration authorities to the investigator. The task of the field worker is to establish by local inquiries whether the death was due to childbearing and, if so, the probable cause. This study is for the purpose of estimating the incidence and clinical causes of maternal mortality in the area under investigation.

Type II.

Type II is a more detailed enquiry in which as much information as is available is collected regarding a limited number of factors influencing maternal mortality. A detailed history of the case is secured for the purpose of arriving at a proper diagnosis and for ascertaining whether one or more of the avoidable factors were present.

The conditions necessary for this type of enquiry are likely to be present in the area covered by a health unit. Registration of deaths would be more accurate than in other rural areas, a woman doctor is often present, health visitors are available and active co-operation between the people, registration authorities and the field investigators may also be expected. The only drawback is that, with a population of only about 40,000, the enquiry may have to be extended over a period of 10 to 12 years for securing an adequate number of maternal deaths for study.

Type III.

Type III is on the same lines as Type II. The only difference is that, when no medical man or woman is available, the services of a health visitor may be utilised for field investigation.

For both types II and III the same schedule may be used. The information collected by the health visitor is bound to be less complete than that by a person possessing medical qualification. In either case, scrutiny of the schedules by an experienced obstetrician is essential for securing a reasonably correct diagnosis and for the assessment of avoidable factors responsible for the maternal deaths.

A survey of existing provision for maternity services is essential for formulating schemes for improvement and tabular statements for the collection of such information in respect of institutional and domiciliary services are also given."

Maternal mortality research.—An enquiry into the causes of maternal mortality in Calcutta was financed by the Indian Research Fund Association and carried out in Calcutta during 1936-37 and some of the findings in respect of these urban deaths were referred to in last year's report. The distribution of deaths by causes is shown in Table III (i) and is compared with the findings of a second enquiry carried out in Bombay under the same auspices and on the same lines during 1937-38. Figures for the three "Health Unit" areas are also shown along with another series of figures for maternal deaths recorded in certain women's hospitals during the same year. The hospital figures refer of course to a selected hospital population, but the others are based on total populations.

TABLE III (i).

Causes of maternal mortality.	Calcutta 1936-37.		Bombay 1937-38.		Rural Health Units 1936-37.		A. M. W. I.* Returns 1937.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Abortion (septic)	33	4.71	10	3.03	...	...	19	3.14
Abortion (non-septic)	4	0.57	6	1.82	...	...	2	0.33
Ectopic gestation	6	0.86	6	1.82	...	...	5	0.83
Other accidents of pregnancy	7	1.00	1	0.30	...	...	1	0.17
Haemorrhage	74	10.56	32	9.70	4	12.90	69	11.40
Puerperal sepsis	224	31.95	133	40.30	11	35.48	192	31.73
Albuminuria and convulsions	126	17.97	36	10.91	5	16.13	107	17.68
Other toxæmias	15	2.14	6	1.82	...	...	3	0.50
Thrombosis and embolism	11	1.57	21	6.36	1	3.23	15	2.48
Accidents of labour and op. shock	26	3.71	18	5.45	6	19.36	88	14.55
Other	10	1.43	3	0.91	...	...	2	0.33
Anæmia	165	23.53	58	17.68	4	12.90	102	16.86
Total	701		330		31		605	
Associated diseases	186		175		6		116	
Grand total	887		505		37		721	

The frequency distribution of the main causes of death is very similar in the four series. In all four groups, puerperal sepsis was the cause of death in about 33 per cent. of the total recorded as due to child-bearing. This proportion is similar to that found in western countries and in the U. S. A. where special maternal mortality surveys have been carried out. Although, therefore, the maternal mortality rate in India is many times higher, at least in urban areas, than it is in the west, the proportion of deaths from sepsis to other causes of death due to childbearing is much the same as in other countries, in spite of the fact that most of the deliveries in this country are conducted by untrained women who have no knowledge of modern methods of asepsis or antisepsis.

Both in Calcutta or Bombay, next to sepsis, anaemia was found the most important cause of maternal death. In this respect, India differs entirely from western countries where deaths from this cause form a negligible proportion of the whole. Special enquiries in Assam, Bombay and Calcutta indicate that many forms of anaemia due to different etiological factors are responsible.

The anæmias of pregnant women are of two main types : one an exaggeration of the anæmia found in the general population due to a low iron-intake and possibly to other food deficiency and to hookworm infection and, the second, a macrocytic hyperchromic anæmia, the etiology of which is not completely understood but which is probably due again to a relative deficiency of certain factors in the diet and in certain cases to chronic malaria. This form of anæmia may occur in both men and women but often develops to a marked degree in pregnancy. As the distribution of types of anæmia varies greatly in different parts of the country and methods of treatment of the different types are not the same, the first step towards its control and prevention is determination of the types occurring in a particular area.

The causation of the toxæmias of pregnancy is obscure and the returns from women's hospitals demonstrate that its distribution varies greatly in frequency in different parts of the country and in different years. In Calcutta, it was shown that a significantly higher proportion of the total deaths from eclampsia took place amongst those women who took a relatively higher protein diet, vegetable, animal or both. During 1937, eclampsia caused 23 per cent. of the deaths due directly to childbearing in three women's hospitals in Madras, 13 per cent. in seven women's hospitals in the U. P. and Punjab, 7 per cent. in Bombay and 4 per cent. in Delhi.*

Accidents of labour and operative shock form a higher proportion of deaths in the hospital groups of cases than in those recorded by the other enquiries based on total population. This was to be expected, since it is the cases of difficult labour which gravitate to hospital. The few figures available for rural areas suggest that this cause of death contributes a relatively high proportion where facilities are few. The incidence of osteomalacia in a district may be expected to increase the number of deaths from this cause, but osteomalacia has a distribution which needs further study. In Calcutta, it was only rarely found to be a contributing cause of maternal death, except in the Marwari community amongst whom it is not uncommon.

Arising out of the findings of the maternal mortality enquiry in Calcutta some of the suggestions for improvement of that city's maternity services may be briefly summarised. The primary need was considered to be a local co-ordinating body to secure greater co-operation between the services for ante-natal care and domiciliary treatment on the one hand and the maternity hospitals and maternity homes on the other. An important function of such a body would be to survey existing facilities and to draw up plans for their improvement and extension. As regards staff, the outstanding requirements were the employment of women doctors, trained in maternal welfare, for the supervision of domiciliary schemes ; larger numbers of trained health visitors, and trained supervision of midwives. Facilities for pre-natal care were found to be grossly inadequate. Clinics should be developed in connection with all midwifery services, whether domiciliary or institutional, and the system of " booking " for confinement should be encouraged as much as possible. Additional hospital accommodation is urgently necessary, because overcrowding of existing institutions commonly occurs at certain times of the year. Especially is there need for a larger number of beds for the treatment of complications of pregnancy, such as anæmia, toxæmia and tuberculosis, and for the segregation and nursing of cases of puerperal sepsis. In view of the importance of anæmia as a cause of maternal morbidity and mortality in Calcutta, schemes for pre-natal care should include special facilities for the detection, investigation and treatment of this condition.

* A. M. W. I. returns from women's hospitals in 1937.

These details have been given here, not because they necessarily apply to other areas, but in order that those concerned in organising maternity welfare schemes may be acquainted with the results obtained from an enquiry which has been conducted in a large urban population. Other areas will probably present different conditions and will demand somewhat varying solutions, but, in the main, it is likely that the methods of prevention suggested for Calcutta will be found suitable, at least for other large urban centres.

Existing Maternity Services.

38. Provincial annual reports continue to provide very inadequate information regarding provisions made for up-to-date midwifery. A new approach seems necessary. The tables set out on pages 11—14 of the Central Board of Health's questionnaire on maternity and childwelfare afford a convenient and concise method of recording the necessary information with regard to the number of pre-natal clinics, the number of obstetric beds in institutions and the numbers of staff available for attendance on the mothers during confinement, either in institutional or domiciliary midwifery practice. It is suggested that these tables might be used in future by all provincial and State public health departments when they are engaged in collecting information on this question. The nature of the hospital accommodation is also important. Hospital beds in general wards cannot be regarded as offering safe conditions for confinement and special wards should certainly be set aside for puerperal sepsis cases. The necessity for inspection and supervision of small maternity homes in order to secure adequate staffing, planning and equipment, and a reasonable standard of safety and comfort for the mothers, are points which have been stressed in previous reports and which require to be reiterated.

Table III (ii), which has been reproduced from the Report on "Maternity and Child Welfare Work in India" prepared by a special committee of the Central Advisory Board of Health gives such information as is available for urban and rural areas in the different provinces of British India and for three Indian States during 1936.

TABLE III (ii).

Name of Province or State.	Urban.			Rural.		
	Number of births in 1936.	Number of maternity beds.	Ratio of maternity beds per 100 births.	Number of births in 1936.	Number of maternity beds.	Ratio of maternity beds per 100 births.
N. W. F. Province	10,404	122	1.1	66,594	2	0.003
Punjab	125,443	2,091	1.7	973,703	172	0.018
Delhi	21,229	147	0.7	9,630	...	...
U. P.	261,439	750	0.2	1,626,159	102	0.006
Bihar	30,087	253	0.8	1,113,921	12	0.001
Orissa	5,631	48	0.8	249,066	13	0.005
Bengal	84,855	600	0.7	1,588,351	33	0.002
C. P.	76,962	245	0.3	574,306	15	0.002
Bombay	130,000	2,436	1.8	612,331	109	0.032
Sind	26,674	466	1.7	52,862	73	0.138
Madras	149,988	1,051	0.7	1,509,637	262	0.017
Assam	6,349	104	1.6	233,355	16	0.007
Hyderabad State	...	224	...	...	15	...
Mysore State	30,088	780	2.5	106,481	100	0.094
Jodhpur State	...	10	...	...	...	...

If the standard of one bed per 100 births, regarded as reasonable in western countries, be accepted, the provision for rural areas is wholly inadequate in every area included in the above table. The inadequacy is particularly marked in Bihar, Bengal, Central Provinces, N.-W. F. Province, Orissa, United Provinces and Assam.

In regard to urban areas, the provision in Mysore, Bombay, Sind, Punjab, Assam and N.-W. F. Province is adequate ; fairly adequate in the provinces of Bihar, Orissa, Bengal, Madras and Delhi ; and insufficient in the United Provinces and Central Provinces.

Information regarding the number of midwives engaged in domiciliary practice in the provinces is too unreliable to warrant the publication of figures. As a general standard, in order to secure reasonable efficiency, one midwife is required for every 100—200 births per annum. Provincial figures relating to the number of midwives employed will be found in Appendix III. The number of trained attendants for confinements in private practice is still unknown, but registration is now in force in the majority of the provinces and it may in future be possible to give some approximate estimate of available services. The urgent need for trained supervision of midwives has been emphasised in previous reports and is a question which deserves more attention than it has hitherto received.

Infant and Child Welfare.

39. *Organisation.*—The children of the nation are one of the State's most valuable assets and few countries are now content to leave the protection and welfare of their future citizens entirely to the head of the family or to the humanitarian efforts of philanthropists or of voluntary organisations. As was pointed out in the 1936 report, the stage seems to have been reached in India when transition from voluntary direction to official control must take place if further developments are to be made, and the problem during the next few years will be to preserve a suitable balance between governmental and voluntary effort. The duties and responsibilities of guardianship of the nation's children must be shared by individuals and by the State. To overrate the importance of the part to be played by either would have a detrimental effect on the work of both. Success depends on mutual participation and on the maintenance of unity by co-ordination of the efforts of each. Technical direction, the training of staff and the provision of grants-in-aid are perhaps the functions which may most profitably be assumed by the State.

Some provincial governments have already assumed responsibility in one of these directions, some in another, whilst still others have not yet played any part. The only provincial government which so far has undertaken all these functions is the Punjab, whilst Madras Presidency has a woman Assistant Director of Public Health for Maternity and Child Welfare but, during 1937, neither Government has given grants-in-aid nor has undertaken the training of health visitors. The Government of Central Provinces maintains a health school and makes a grant for maternity and child welfare to the Indian Red Cross Society. Other provincial governments delegate the whole of this work to voluntary organisations, maintaining a greater or lesser degree of control over the policy practised through their official representatives on the managing committee and by grants-in-aid to the societies concerned.

Maternity and child welfare schemes are now undertaken by a considerable number of municipal committees, but, except in a few instances, these are far from complete. In Delhi and New Delhi, two medical women organisers are employed and 18 welfare centres in charge of trained health visitors are maintained by the municipal committees. Domiciliary confinements are conducted by trained *dais* or midwives working in association with the centres and fees are recovered for the services of these attendants. No municipal maternity homes have yet been established. Hospital accommodation, totalling 147

maternity beds, is available in three women's hospitals. The Calcutta Corporation maintains four maternity homes and employs in addition a staff of six medical women and 25 midwives for domiciliary midwifery, but practically no preventive or educational maternity and child welfare work is done. Two voluntary organisations, the Bengal Branch of the Indian Red Cross Society and the Rama Krishna Mission are carrying on work of a more constructive nature in Calcutta. The Indian Red Cross Society has seven centres with trained health visitors in charge, their work being supervised by a woman doctor. A systematic follow-up by the health visitors is made of all registered births in limited areas surrounding the centres. The Rama Krishna Mission does ante-natal and infant care in connection with its own maternity home and also provides a small domiciliary service. Work on these lines is sound but requires much further development because many large areas in Calcutta are still entirely without any such facilities.

Madras city has a staff comprising a lady superintendent, five medical women, three maternity supervisors, 22 health visitors and 82 midwives, working in connection with 12 welfare centres.

Each woman doctor has charge of two to three centres covering in all an area of about 6.9 square miles. She is, therefore, able to attend each centre only twice a week and ante-natal clinics are held only twice a week. Infants and toddlers clinics are held once a week during the afternoon. The women doctors also visit puerperal cases and attend to urgent calls. Of a total of 30,958 births in Madras city during 1937, the cases that came under the supervision of the maternity and childwelfare scheme numbered 14,589 (47 per cent.) and among them 48 maternal deaths took place giving a rate of 3 *per mille*. The mortality rate of infants under the care of the scheme was 112.3 *per mille*. The following table gives the maternal and infantile mortality rates for the populations served by the welfare scheme from 1933 to 1937.

						Maternal mortality.	Infantile mortality.
1933.	.	.	.	.	.	3.1	142.7
1934.	.	.	.	.	.	3.4	142.3
1935.	.	.	.	.	.	3.0	138.2
1936.	.	.	.	.	.	3.7	124.2
1937.	.	.	.	.	.	3.0	112.3

Whilst the tendency of infantile mortality is to decline, maternal mortality has remained stationary during the whole period.

Investigation of the clinical causes of death in infancy and childhood is much to be desired, but it must be recognised that accurate diagnosis of the clinical cause of death may be of less moment, from the point of view of saving life, than a knowledge of the social, economic and environmental conditions which react on the child's health from the day of its birth. Leaving aside the wider problems of the social structure which are not easily susceptible of assessment and are notoriously difficult to control, modification in the immediate environment of the child and in the social customs and habits which adversely influence health can be effected to some extent by education of the parents. It must be recognised, however, that results in the form of a rapid reduction of the mortality rates are not to be expected from educational efforts. At the same time, a certain measure of success can be and is being achieved. To adopt a defeatist attitude in the face of problems so vital to the well-being of the nation, simply because the complex problem cannot be tackled in its entirety, is fortunately not a policy likely to command general acceptance either by official departments or by voluntary associations.

As an example of what can be accomplished, the following figures are quoted from the reports of the Maternity and Child Welfare Centre attached to the All-India Institute of Hygiene and Public Health, Calcutta. Before the commencement of the maternity, and child welfare scheme, the infant mortality in the area from which the centre draws its clientele had for years been in the neighbourhood of 400—450 per 1,000 registered live births. To a considerable extent the high rates recorded were due to defective registration of births, but even allowing for a large error, they must be considered regrettably high. Registered birth lists were supplied twice weekly by the district health officer to the maternity and child welfare staff and all births were followed up within a few days of receipt of the notice. Non-registered births found in the course of home visiting were also reported. The percentages of error in the birth registration in the area were 37 per cent. in 1934, 22 per cent. in 1935, 19 per cent. in 1936 and 22 per cent. in 1937.

The infantile mortality rate in the area was 196 *per mille* in 1936 and 216 *per mille* in 1937, these figures being based on total live births, registered and detected at home visits. During 1936, the mortality among infants recorded on the centre's cards, which included all infants registered and found to be living at the time of follow-up was 122 per 1,000 infants on the rolls and in 1937, 111 per thousand.

During 1937, the number of children under the care of the staff was 944, of whom 44 per cent. attended the clinic. Contacts were made with 484 expectant mothers, of whom 72 per cent. attended the centre, a number actually in excess of the total births (459) in the district in the same period. It does not follow that all the mothers of infants born had ante-natal care for many pregnant women leave the district before delivery and others come into it for delivery ; it does, however, indicate a well-developed ante-natal service. The maternal mortality rate in the ward was 28·6 per 1,000 live births during 1936 and 19·6 in 1937. During part of 1936 and part of 1937 the Indian Research Fund Association investigation of maternal deaths was carried out in Calcutta, and the city rate was found to be 24 per 1,000 live registered births. During 1936 there was only one death in 215 deliveries among women who had ante-natal care, or a maternal mortality rate of 4·6 per 1,000 deliveries ; in 1937, there were three deaths in 251 ante-natal cases delivered or a maternal mortality rate of 11·9 per 1,000. These two figures compare favourably with the maternal mortality of the area and with recorded rates in other parts of the country where careful investigations have been made.

Other centres may keep equally accurate and detailed records, but analyses of the figures are rarely published and thus much valuable information is lost. It must be acknowledged, however, that many of the 800 welfare centres now in existence in India are not in a position to supply comparable figures. Few centres have a complete staff of visiting doctor, health visitor and midwives, few undertake intensive work in a limited area, or cover all or even the majority of births. Neonatal deaths are particularly susceptible to error unless birth and death registers are kept in the centres, because no cards are kept for these children and so far no investigation forms for stillbirths and neonatal deaths have been introduced for the use of maternity and child welfare staffs. Moreover, few centres have developed equally the pre-natal, intra-natal and post-natal aspects of the work. The United Provinces, for instance, have 293 welfare centres, but only employs 22 health visitors as against 19 doctors and 328 midwives. The inference is that midwifery and medical relief occupies a predominant place in the activities of the welfare centres in this province. The Punjab, with 89 centres and 91 health visitors, has a sounder organisation

from the preventive and educational viewpoint, but that province still has a serious lack of visiting doctors to carry out the medical examination of expectant mothers and to supervise the health of infants and children. Effort has also been largely directed to the training of hereditary *dais* with the object of providing more skilled attendance at childbirth. In Madras Presidency, 32 medical women, 17 health visitors and 351 midwives are employed by local bodies. Many of the medical women are touring officers in charge of a district and they visit the centres in turn to conduct consultations, ante-natal and infant welfare clinics and to supervise the work of the subordinate staffs. The 351 midwives conducted 35,288 confinements, an average of just over 100 confinements per annum per midwife. The proportion of antenatal and post-natal visits has not been stated. A total of 59,987 expectant mothers, 31,922 infants and 31,183 pre-school children came under the care of the welfare staff or 123,092 in all. The total numbers of home visits paid by the medical women, the health visitors and the midwives respectively were 25,290, 58,878 and 507, 986.

Obviously few of the expectant mothers, infants and pre-school children received even one home visit per annum from the doctor or health visitor and the amount of educational work therefore remains very limited.

SECTION IV.

Public Health Administration.**Introduction.**

40. The year 1937 might be said to mark the opening of a new stage in the development of public health administration in this country. In April, under the new Government of India Act, wide powers in the field of self-government were conferred on the provinces and the franchise was largely extended in order to make provincial governments more responsible to the people. In June, the Central Advisory Board of Health was inaugurated and necessary provision was thus made for joint discussion by representatives of the Central, provincial and State Governments and for the formulation of common lines of public health policy. In August, under the auspices of the Health Organisation of the League of Nations, an Inter-governmental Conference of Far-Eastern countries was held at Bandong (Java), at which many public health problems affecting rural populations came under review, and were made the subject of a series of important recommendations. These three major events have prepared the way for a more rapid advance in the field of preventive medicine and in due course are bound to have far-reaching effects on public health administration throughout every part of India.

Although it is yet too early to assess the results of the changes in provincial government, one striking feature of the new order is the common desire to attack the problems of social ill-health on a wide front, in which economic uplift, improvement of health, reform of the system of education and other ameliorative measures all find a place. The problems of public health are so intimately associated with those of the other aspects of community life that the value of this many-sided attack cannot be overestimated. In the general field of public health endeavour, perhaps the most welcome feature is the increasing attention being paid to the welfare of the rural populations. Rural medical relief, the provision of safe village water supplies, better sanitation, maternity and child welfare work and special campaigns against diseases like malaria, tuberculosis and leprosy are all subjects of fresh activity.

The average population served by individual medical institutions varies widely in the different provinces, both in rural and urban areas. During 1936, in the case of rural populations, this number ranged between 17,247 in Coorg and 124,330 in the United Provinces, whilst the average figure for the whole of British India was 53,349. In the case of urban populations, the number varied between 3,242 in Assam and 19,825 in Delhi Province. From these figures it is obvious that, although the requirements of individual provinces differ widely, a considerable increase of existing provisions both for rural and for urban populations is everywhere essential. The grant of subsidies in order to stimulate the flow of medical practitioners from the large towns and cities into the villages appears to be the most favoured method in all provinces. Since duplication of medical and health services for the rural areas is at present largely impossible, both because of the cost involved and of the lack of trained

personnel, in any schemes designed to cover the existing needs of the rural populations, the rural doctor must be qualified to perform both curative and preventive functions. To reach this end, it is essential that greater emphasis should be laid on the preventive aspects of medical practice during the whole of the medical student's course of training, in order that the future practitioner may recognise the importance of prevention of disease and the maintenance of general health in the community which he serves. The necessity for such a re-orientation of the curriculum of medical colleges was emphasised in a unanimous resolution passed at the inaugural meeting of the Central Advisory Board of Health and since then the Indian Medical Council and all Provincial Governments have had this question under active consideration. As the matter is of such immense importance to the future welfare of the people of India, it is much to be hoped that early action will be taken in every medical college and school in the country.

Another important fact which requires emphasis is that permanent results can be achieved only by securing the interest and co-operation of the people in health measures designed for their own benefit. State aid is no doubt essential for developing social ameliorative measures, whilst skilled guidance must be provided by governments and local authorities; nevertheless, the individual will reap the maximum advantage only when he himself contributes towards such schemes. In this sense, co-operative effort for the creation and maintenance of social services forms the foundation of success, although both private and public aid are essential concomitants.

*"That the individual should be stirred by compassion for the sick and suffering is fitting. That he should respond to distress in the persons he is in contact with is of itself a sign of his own health and vitality. Such personal transactions weld life in one rich and homogeneous whole. But when compassion for the sick and distressed is relegated to the mere disbursal of moneys through a vast and therefore mechanised organisation or, worse still, through the State, the aspect changes. With loss of the personal relationship between donor and recipient, virtue evaporates. The donor by his gift may unwillingly be reducing the recipient to dependence and ultimate spiritual destitution."

In other words, state aid should always be supplemented by contributions from the individual himself. The latter is thereby enabled to retain his self-respect, whilst his personal interest becomes awakened in respect of measures meant for his own welfare.

Extension of rural medical and health relief through the institution of co-operative societies has been proposed in more than one province. Successful efforts in this direction have already been made in the Punjab and the latest scheme has been recently evolved in Madras Presidency. In the latter province, it has been proposed to group together a certain number of villages as a single health centre, the villagers being invited to become members on payment of two annas either in cash or kind. The scheme is controlled by the Government co-operative department and each health centre is to have a qualified doctor, a midwife and an attendant maintained by the department. In return for his membership fee, the villager obtains the services of the doctor at the dispensary without payment, medicines being supplied at cost price. For attendance of the doctor at his home, the member pays a fee of four annas to the co-operative department for each visit. The doctor's salary has been fixed at Rs. 50 a month, with free quarters, and he is apparently permitted to receive

*"The case for action, a survey of every day life under modern industrial conditions, with special reference to the question of health", by I. H. Pearce & G. S. Williamson, Faber & Faber, Ltd., London.

fees. Every medical officer receives special public health training before appointment.

This scheme has many attractive features, the principal being that of developing rural medical and health relief on the basis of a mutual benefit society. Care will undoubtedly be required in working out details, but the scheme deserves serious consideration from all provincial governments. It may be anticipated that during the next few years the attempt will be made to evolve similar schemes in other parts of the country.

Repeated reference has been made in these annual reports to the necessity for comprehensive public health legislation in the provinces, partly for the purpose of bringing together the measures now distributed over various acts and partly to bring public health law more up-to-date. During recent months, a new and comprehensive Public Health Act has been passed by the Madras legislature. This Act, *inter alia*, provides for a statutory Board of Public Health whose function will be advisory in respect of the formulation of health policy. The Minister of Health is the Chairman of the Board and its members include the Minister for Local Government, the Surgeon General, the Director of Public Health, the Sanitary Engineer, another officer nominated by Government and three nominated members of the Legislature. The Director of Public Health has been vested with largely increased powers and has been made statutorily responsible for carrying out the health policy of the Government. Local authorities are bound to carry out the measures suggested by him, a right of appeal to Government being given to them when a difference of opinion arises. Government has also been given powers to compel local authorities to appoint health officers and to fix the scales of salary and the conditions of service of the health staffs employed by these authorities. Subject to such rules as may be prescribed by Government, the Director of Public Health has power to transfer members of the public health staffs maintained by local bodies from one health authority to another. Control of the subordinate health staffs of district boards and municipalities has been vested in the health officers concerned. Subject to such control as may be prescribed by Government, health officers have been authorised to perform the functions of an executive authority in public health matters with respect to existing Acts, such as the Madras District Municipalities Act, Madras Local Boards Act, Places of Public Resorts Act and the Madras Prevention of Adulteration Act. Members of the public health staff, not below the rank of a sanitary inspector, have also been vested with power to arrest offenders against the Acts. In respect of essential public health amenities, such as water supply, drainage, etc., power has been provided for the enforcement of desirable standards. Provision has also been made for a well-equipped organisation to meet outbreaks of infectious disease, the Government employing temporary additional health staff in the event of the prevalence or of the threatened outbreak of such disease. Other provisions relate to maternity and child welfare work, abatement of overcrowding, control over insanitary buildings, reservation of areas for residential purposes, food control, registration of lodging houses and special measures for the control of fairs and festivals.

In Madras Presidency, where the public health organisation had previously been developed on a wide basis, the new public Health Act has provided up-to-date machinery for a fresh and great advance in public health administration. Although no other province in India has so far provided itself with a consolidated Act, it must not, however, be assumed that progress has not been made. In many directions advance has taken place in different parts of the country,

and, if Madras Presidency has been cited as an instance, this has been done only because the progress registered in that province during the past two decades has been satisfactory, and because of the hope that the larger opportunities now provided to provincial Governments will stimulate them to corresponding effort. There is no question that consolidated and comprehensive public health enactments are required in every province and State in India.

Rural Health.

41. The main features of the rural health campaign in India were discussed in last year's report and further details will be found in the paragraph entitled "Forty years of public health progress in India" which appears in section XI (page 231). The outstanding event during 1937, from the point of view of rural health administration, was the inter-governmental conference held in Java. India was represented by a strong delegation, which took an active part in the deliberations, and, in many directions, the recommendations made pointed to lines of action already adopted in this country. The resolutions passed by the conference fell under five heads, (1) health and medical services, (2) rural reconstruction and collaboration of the population, (3) sanitation and sanitary engineering, (4) nutrition and (5) measures for combating, in rural areas, certain diseases like malaria, plague, tuberculosis, leprosy etc.

I.—Health and Medical Services.

(1) The conference emphasised the importance of decentralising medical and health services and, at the same time, pointed out that a central body should be formed to guide and supervise their activities and to ensure uniformity in policy.

Decentralisation has long been an accepted principle in India. As far back as 1888, the Government decided that medical relief and public health administration should form functions of the then newly constituted local authorities. Further, by the Government of India Acts of 1919 and 1935, these subjects were transferred to the jurisdiction of provincial governments. In addition, co-ordination has been secured by the inauguration in June, 1937, of the Central Advisory Board of Health whose members comprise representatives of the Central, Provincial and State Governments and their health advisers.

(2) In regard to medical education, the Java conference expressed the opinion that the highest scientific level of theoretical and practical training should be attained and that the spirit of preventive and social medicine should permeate more and more the whole programme of medical studies.

Reference has already been made to action taken in this respect.

(3) The Java conference considered it desirable that the principle of local support for health measures should be inculcated and that there should be a division of financial responsibility between local bodies and the central authority.

This principle has been in practice in India ever since local bodies were established about fifty years ago. Further, the Central Advisory Board of Health at its meeting in 1937 passed a resolution advising provincial and State Governments to allot funds to municipal and district boards for the

development of public health schemes. The Board also suggested that Governmental assistance should be given in the form of percentage grants-in-aid in order to encourage local public health developments and, at the same time, to maintain a measure of governmental supervision and control.

(4) The Java conference emphasised the importance of security of tenure to the members of all health services, so as to enable them to discharge their functions efficiently. The grant of adequate emoluments for the purpose of attracting the proper type of man, was also made the subject of a recommendation.

In many provinces, rural health officers are now maintained by the Provincial Governments; in Madras Presidency, both municipal and rural health officers are whole-time servants of Government.

The Central Advisory Board of Health had already dealt with this question at its meeting in June, 1937. It recommended that all provincial Governments should possess powers (a) to form provincial public health services, (b) to require municipalities and local boards to appoint medical officers of health and (c) to lay down suitable conditions for the recruitment, qualifications and terms of service of health officers. The Board also suggested that, where provincial Governments did not possess such powers, they should take the necessary steps to acquire these powers by legislative measures.

II.—*Rural Reconstruction and Collaboration of the Populations.*

The Java conference strongly emphasised the importance and urgency of rural reconstruction as a primary function of every Government and stressed the necessity for co-ordination of the activities of all agencies, governmental and voluntary, in order that the services rendered might be "integrated, comprehensive and effective". The conference expressed the opinion that health and rural work would be productive of effective results only if it was carried out in an intensive way in limited areas and if approach towards improvement of the existing state of affairs were made by securing adequate co-operation from the villagers themselves.

Experiments in intensive rural health work in restricted areas have been in progress for the past few years in the provinces of Madras, the United Provinces and Delhi and it is hoped that similar schemes will shortly be started in Bombay and Bengal. It may be added that these experimental schemes have been largely made possible by generous financial support from the Rockefeller Foundation.

III.—*Sanitation and Sanitary Engineering.*

The Java conference resolutions under this head emphasised the importance of rural water supplies, of the proper disposal of human excreta and household refuse and of the necessity for fly control and for research work concerning flies. Governments were also asked to constitute committees for small-village planning in order to avoid "*Laissez faire*" development and to set up local standards as regards sites, types of houses, ventilation, lighting and heating, sewage and sullage disposal and water supplies.

Whilst the provision of rural water supplies and of conservancy measures has been receiving more and more attention from provincial Governments these questions are of such magnitude that little more than the fringe of the problems involved have so far been touched. What is required is long-term planning both by provincial Governments and by local authorities. In the

first place, information must be collected in order to prepare a priority list of villages, such matters as scarcity of water-supply, repeated incidence of cholera outbreaks and the occurrence of periodical fairs and festivals, all being taken into consideration in settling the question of priority. By allotting an initial sum of ten or twenty lakhs, the nucleus of a fund could be formed, and this should be supplemented by annual grants ear-marked for the improvement of rural water-supplies. Details of a scheme of this nature which has been adopted by the Government of Madras will be found in Section VII (page 173).

IV.—*Nutrition.*

This subject has been discussed at considerable length in these reports during the past few years and it has again been included in Section XI of the present report (page 236).

V.—*Measures for combating certain diseases in rural areas.*

(1) The Java conference expressed the opinion that malaria produces more sickness and mortality in the rural populations of Far-Eastern countries than any other disease and this statement is certainly true of India. The conference went on to urge that the amount of money and energy devoted to the control of malaria should be in proportion to the importance of that disease. It was suggested that, in view of the value of practical demonstrations of malaria control as a means of arousing the interest both of the lay public and of health administrators, controlled areas should be studied, along with corresponding areas in which no control was exercised, and exact estimates made of the differences to be observed. In order to obtain observations of real value, funds should be allotted so that the experiment should extend over a period of at least five years. This recommendation is in keeping with action already taken by the Indian Research Fund Association which has allotted the bulk of a grant of Rs. 10 lakhs, given in 1936-37 by the Government of India, for experimental schemes in Madras Presidency, United Provinces, Assam and Bengal. The comprehensive programme of anti-malarial measures which has been in operation in and around Delhi during the past two years will also be of great educational value, not only to malariologists and health officers but also to engineers and administrators. Reference to these various schemes will be found in section XI (page 232).

The Indian Research Fund Association has for many years past maintained the Malaria Institute of India whose officers are not only constantly engaged in malaria research but are regularly called upon to advise provincial and State Governments, local bodies and other authorities on malaria problems. The Malaria Institute also publishes a Journal entitled "Records of the Malaria Institute of India" in which are to be found details of all important research and other anti-malaria work.

(2) The Java conference recommended that every effort should be made to extend the free distribution of cinchona products.

Two to three years ago, the Government of India placed at the disposal of provincial Governments large quantities of quinine for free distribution to their malaria-stricken populations. Since then a survey has been carried out by an officer with long experience of cinchona cultivation in this country, with a view to the discovery of additional areas suitable for the cultivation of the cinchona plant. It may be recalled that the quantity of quinine at present produced in India forms only a small fraction of the amount required.

(3) The effect of construction works on the production of rural malaria and the importance of co-operation between engineers and malariologists in carrying out such works was also emphasised at the Java conference. The suggestion was made that engineers should be given instruction in the fundamental principles of anti-malaria measures before assuming executive responsibilities in the tropics and that suitable pamphlets or brochures should be prepared for the guidance of all engineers.

In this connection, it may be recalled that the Indian Medical Research Workers' Conference passed the following resolution in 1936 :—

“ Since a large amount of malaria is produced by the execution of engineering projects, this conference recommends that all engineers should be required to undergo a short course of training in the elements of tropical sanitation before taking up appointments in Government Service. ”

One of the Government of India's Health Bulletins (No. 22), prepared by the Malaria Institute of India, is entitled “ Man made Malaria in India ” and has received wide circulation. In accordance with the Java Conference recommendation, another Health Bulletin (No. 25), has recently been issued. This Bulletin has been prepared by officers of the Malaria Institute of India in consultation with a number of experienced engineers and contains up-to-date information on anti-malaria problems and on the measures to be taken to minimise the incidence of malaria in construction works' areas.

(4) One of the resolutions of the Java Conference drew attention to the necessity for improving existing houses and for the construction of new houses based on rat-proof designs. The Indian Medical Research Workers' Conference passed the following resolution in December 1937 :—

“ The construction of rat-proof dwellings in rural areas is an anti-plague measure of the highest importance. The conference notes with regret that little had been done in this direction and draws the attention of provincial Governments to the advisability of preparing plans of rat-proof dwellings suitable for the construction of village houses. The construction of such houses should be encouraged in endemic areas. ”

(5) The resolutions on the subject of tuberculosis lay down the principles for organising anti-tuberculosis campaigns in Far-Eastern countries. They have a particular interest for India in view of the appeal, issued in 1937 by Her Excellency the Marchioness of Linlithgow, for funds to be devoted to a wide campaign against tuberculosis in this country. The King Emperor's Fund and the King George's Thanksgiving Anti-Tuberculosis Fund have recently been absorbed by the newly formed Tuberculosis Association of India. This central organisation and the affiliated provincial and state associations, which are in the process of formation, will, it may be anticipated, go far to promote an increasingly effective campaign against this disease.

(6) In the existing state of knowledge regarding the transmission of leprosy, the Java conference recommended isolation of as many infectious cases as possible in private houses, in huts outside villages or in colonies. The suggestion was also made that adequate attention should be paid to nutrition and physical occupation in addition to specific treatment.

In India, the anti-leprosy campaign is being carried on under the auspices of both governmental and voluntary organisations. Of the latter, the Indian Council of the British Empire Leprosy Relief Association and the Mission to Lepers are the most important. Over 1,100 leprosy clinics are now functioning in different parts of the country, these being maintained partly by provincial Governments and partly by local bodies and voluntary organisations. A few large leper hospitals also exist, most of these being missionary institutions.

The Indian Council of the British Empire Leprosy Relief Association with its provincial branches, takes an active part not merely in organising relief to lepers but also in carrying out, both in the laboratory and in the field, research work on various aspects of the leprosy problem. Further, periodical courses of instruction in modern methods of diagnosis and treatment are offered to medical men from all parts of the country, and, so far, over 1,000 medical men have attended these courses. The Indian Research Fund Association, the Calcutta School of Tropical Medicine and the All-India Institute of Hygiene and Public Health all assist the Indian Council in these activities.

School Medical Inspection.

42. The importance of a well organised school medical service in a national health programme requires no special emphasis. "Medical Science has proved with unmistakable clearness that disease and incapacity in adolescence and adult life find their source, all too often, in the seed-time of childhood. It cannot be doubted that much of the excess of sickness and mortality under forty years of age must be attributed to this origin—and some of the maternal mortality, some of the recruits rejected on physical grounds, some of the lost time in industry, some of the lack of resistance to infective disease may all derive from this same source." These words of the Chief Medical Officer to the Board of Education, England and Wales, in his 1933 report are equally applicable to India. Further, when it is considered that, in this country, nearly 49 per cent. of the total annual deaths take place among children under 10 years of age while the corresponding figure for England and Wales is only 11 per cent., the urgency of the need for adequate supervision of the health of school children in India becomes all the more apparent.

When school medical inspection was started in England in 1908, local education authorities were required to make provision for :

- "(1) Medical inspection of all children, on a schedule prescribed by the Board immediately before or at the time of their admission to school, before they left school, and at an intermediate period, i.e., three times during their school life; (2) a system of 'following-up' the child after inspection; (3) medical treatment to be made available, 'arrangements for attending to the health' for those found to be in need of it; (4) appropriate supervision as regards cleanliness; (5) the supervision of the special schools for blind and deaf and for defective and epileptic children; (6) the teaching of hygiene in the schools; (7) the teaching of physical training in the schools; and (8) the supervision of the administration of school meals."

In 1934 the Chief Medical Officer reported that most Education Authorities had already "built this foundation and upon it a considerable superstructure". Dental inspection and treatment were added at a later stage.

In India the school medical service is one of the least developed branches of public health administration. In no part of this country has there been developed such a comprehensive health service for school children as has been outlined above for England and Wales. In the provinces of Madras and Bombay medical inspection was in abeyance in 1937 while in Assam the report of the Director of Public Health mentions only periodical medical inspections of selected institutions and the submission of recommendations to the school authorities for improving the health of the pupils and the general sanitation of schools and attached hostels. In certain other provinces a school medical service has been developed in selected areas, usually urban. Even in such areas the provision for follow-up of defective children and for treatment of the conditions revealed by medical examination are inadequate, though the amount of provision varies from province to

province. At the same time it is necessary to record that enthusiastic medical officers have been able to organise, in some places, treatment centres for defective children and the issue of milk or mid-day meals to under-nourished children. Physical education has also been receiving more attention during recent years and such information as was available from individual provinces was summarised in a special note on this subject in last year's report.

A description of school medical inspection in individual provinces is given in later paragraphs. The following table gives such figures as are available for different provinces regarding important defects revealed by medical inspection of school children.

Percentage of pupils examined showing physical defects.

		Malnutrition.	Skin diseases.	Defects of vision.	Enlarged tonsils and adenoids.	Dental caries.	Enlarged cervical glands.	Total defects.
N.-W. F. P. (5 principal towns).		...	0.8	2.0	4.4	6.0	...	81.6
Delhi	Boys	7.7	1.9	6.5	24.0	6.7	9.2	77.1
	{ Urban	0.2	4.1	1.5	2.5	3.6	2.1	29.3
	{ Girls	3.4	2.0	5.0	4.9	12.8	0.8	55.4
U. P.	Urban	12.0	4.2	14.0	12.0	12.7	8.3	60.0
	Rural	18.3	3.9		4.1	8.7	1.4x	34.0
Bihar		16.7	...	...	13.1	5.4*	...	45.4
Bengal	City of Calcutta.	20.0	2.7	...	11.9	12.7	...	...
	Other municipalities.	25.9	5.1	...	6.6	10.4	...	...
	Rural Areas	15.0	8.2	...	1.5	6.9	...	...

xAll glandular enlargements except those of tonsils and adenoids.

*Including pyorrhœa.

For certain provinces figures relating to particular conditions are not available.

The value of the figures for inter-provincial comparisons is doubtful because of the personal factor associated with these findings when medical inspection is carried out by a variety of officers differing in their medical equipment and clinical experience. The figures for malnutrition are of even more doubtful value for the reason that no common standards had been adopted for judging this condition. However, taking the figures as they stand, the percentages for individual and for total defects in the various provinces differ widely. The differences in respect of the same defect for boys and girls living in the same area are also striking. For instance, in the urban areas of Delhi province, 24.0 per cent. of the boys examined suffered from enlarged tonsils and adenoids while the percentage for girls was only 4.9. With regard to dental caries the position is reversed, the respective percentages for boys and girls being 6.7 and 12.8. For those provinces in which rural and urban figures are separately available, the incidence of enlarged tonsils and adenoids appears to be higher in urban than in rural areas. The same remark applies to dental caries, enlargement of cervical glands and defects of vision.

As regards individual provinces, in the North-West Frontier Province, medical inspection of school children is carried out in the towns of Peshawar, Bannu, Dera Ismail Khan, Kohat and Abbottabad by three whole time sub-assistant surgeons and two part-time medical officers. During the year under

review, on the formation of Mardan District, a whole time sub-assistant surgeon was appointed to the district for school medical inspection work. Among 17,044 school children examined during the year, the number of children requiring treatment was 13,908 or 81.6 per cent. Of these 11,871 or 85.5 per cent. actually received treatment.

Sixty school buildings including primary, middle and high schools of the five municipal towns mentioned above were inspected every quarter for general sanitation, the defects found being brought to the notice of school authorities for rectification. A scheme of daily supply of milk to school children is reported to be in operation in the majority of schools in the province, some schools also providing mid-day meals to necessitous children; the teaching of personal and home hygiene and of 'first-aid' to the injured is reported to have been enforced in all High Schools.

In the Punjab, since 1931, medical inspection of children attending boys' schools in urban areas has been conducted on an experimental basis. Control of medical inspection has been vested in the full time Health Officers of municipalities, wherever such officers have been appointed. Out of 15 municipalities, school medical work has been organised on a satisfactory basis only in four.

It was mentioned in last year's report that, in Delhi Province, a comprehensive scheme of medical inspection of schools was under consideration at an estimated annual cost of approximately Rs. 28,000, the different local authorities making substantial contributions towards this amount. The report of the Chief Health Officer for 1937 shows that advance was made only in New Delhi and Timarpur Notified Area. At Timarpur, the existing scheme of medical inspection was supplemented by the opening of specialists' clinics for dental and ophthalmic work in November 1937, but the Chief Health Officer considered that, owing to the absence of a whole time medical officer, the scheme was not a success. In New Delhi, on the other hand, greater success has been achieved and the scheme "has earned the appreciation of parents and scholars alike".

Under the new scheme in New Delhi, each child undergoes a routine examination once a year and all defects falling within the scope of "first-aid" are dealt with at the school clinic. For conditions requiring more specialised care, such as enlarged tonsils and adenoids, the parent is recommended to seek appropriate treatment in a hospital. For ophthalmic and dental service, the New Delhi Municipality has provided clinics of two hours' duration on two days a week for boys and on two days a week for girls separately. Specialists in the two subjects have been appointed and the popularity of these clinics is steadily increasing.

Besides the annual examination, a child may be referred to the medical officer by the parent or schoolmaster. "In routine and casual examination record cards are filled in by the School Medical Officer so that a complete medical history of each child is built up which may be of great value at any time later in life in the diagnosis and treatment of any illness which may supervene."

New Delhi Municipality spends nearly Rs. 6,300 a year on this scheme which serves approximately 2,400 children, and recovers a sum of about, Rs. 1,350 by charging a fee of two annas per pupil in the senior classes. The Chief Health Officer has pointed out that the services that parents get for this small payment are of a wide and varied nature. "The School Medical Officer, besides carrying out the routine examinations and treatment of ailments, keeps

an expert eye on the ventilation, lighting, heating and over-crowding in class rooms, on the fruits and sweets bought by the students during the recesses, on the protection of the drinking water, on the amount of physical drill or games any individual child may reasonably indulge in without straining his health, on the exclusion from school of children suffering from infectious disease and their "contacts" until the prescribed period laid down."

In October 1937 a milk scheme for school children was introduced in this municipality and pasteurised bottled milk was made available at a price of 1½ annas per pound for whole milk and at half this price for skimmed milk. However, the Chief Health Officer reported that the response from parents was disappointing. In addition to this scheme, the Municipal Committee sanctioned an expenditure of Rs. 244 on milk for undernourished children of poor parents and 49 boys and 40 girls received this milk supplement with definite benefit to their health.

In the rural areas of Delhi province sub-assistant surgeons in charge of dispensaries are responsible for medical inspection during their routine tours of inspection. They record their findings and, if available, provide village school masters with a small 'first-aid' box of simple remedies. The Chief Health Officer considers that, without an improvement of village communications, it would not be possible to provide a better system of medical inspection.

In the United Provinces*, the scheme for medical inspection was started under the Education Department with part-time medical officers in 10 of the largest towns of the province. In 1931 the school medical service was transferred to the Public Health Department and, in the succeeding years, there occurred a progressive expansion of the activities of this service. Through the Red Cross Society, the Junior Red Cross and the St. John Ambulance Association, on which officers of the Public Health and Education Departments are represented, co-ordination of effort between the two departments has been established.

Further, conferences have been held at which school medical officers have had the opportunity of explaining to teachers and parents the aim and scope of school health work and of thus promoting their intelligent co-operation in developing this aspect of preventive medicine. The service consists of :

- (a) Whole time officers in 13 of the largest towns,
- (b) In other municipalities the health officer, wherever he has been appointed, is *ex-officio* school medical officer.
- (c) In small municipalities and in the rural areas of districts in which the district health scheme has been introduced, district health officers are *ex-officio* school medical officers.

Since July 1934 central school clinics have been established in the cities of Agra, Allahabad, Cawnpore, Benares and Lucknow, the whole time school medical officers of these municipalities being in charge of these institutions. A monthly fee of one anna is charged per pupil for the maintenance of these clinics. These institutions are reported to be doing good work. They are centres for follow-up work and much educational work is also being carried on because parents come into contact with the school medical officers. The

*" Development of Health Education Work in United Provinces " by Khan Bahadur Dr. Abdul Hamid, Assistant Director of Public Health, the United Provinces, *Indian Medical Gazette*, October 1937.

clinics are held in the afternoon and scholars have attended them regularly for ailments which need a prolonged and regular treatment. The clinics have also served as a sorting station for cases which require hospital treatment and operations. Their growth in popularity is evidenced by the recorded increases in attendance from year to year, the total attendance at these five clinics being 25,000 in the first year, 37,000 in the next and over 43,000 in 1936-37.

In other municipalities where whole time school medical officers are working, various methods have been tried for making treatment available to the children. In Bareilly, Jhansi, Meerut, and Gorakhpur these officers have, by previous arrangement, attended the Sadar Hospitals at fixed hours for treating defective children. "In Gorakhpur the schools have formed a school-boys' medical service association for the treatment of scholars by levying a fee of six pies per boy per month to meet the expenses of the treatment of vision and dental cases by local practitioners."

In other urban and rural areas, where medical officers of health perform school health work as part-time school medical officers, arrangements for the treatment of defective children are mainly confined to the issue of 'vouchers' to such children. When a child presents such a 'voucher' at a hospital or a dispensary he is treated without delay in order to allow him, if possible, to go back to school. From the available figures it is clear that the system falls far short of the requirements because a large majority of the children do not go to hospital.

In Bihar the Government since 1920 have maintained a special staff of officers for the medical examination of students of high schools, this system having been extended in later years to middle english schools also in places where high schools existed.

In respect of new admissions, thorough examination is carried out and a complete medical history is recorded for each student. All those in whom defects are noted are re-examined at subsequent inspections. Parents or guardians of pupils with physical defects are advised to give adequate treatment to the latter either through their own medical attendants or through the nearest hospital or dispensary. Medical officers of dispensaries and hospitals are required to note on the forms produced by the pupils the treatment given and the results of such treatment. From 1933 onwards some school clinics attached to divisional hospitals have also been started and school medical officers are required to attend these clinics during their stay at the headquarters.

Among 11,430 boys examined during 1937, those with one or more defects numbered 4,958 or 43.4 per cent. Of 947 girls examined the corresponding percentage was 69.2.

In Orissa the Government maintains a school medical officer and an assistant school medical officer for examining the students of all high schools and most of the middle english schools in the province. In the rural areas the services of the district board health staff and dispensary doctors are utilised for inspecting middle english and middle vernacular schools. Primary school children have not been brought within the scope of the scheme because their number is too large for the existing staff. Of a total of 4,087 students examined 61 per cent. were found defective in 1937 as against 82 per cent.

and 70 per cent. in 1935 and 1936 respectively. The common ailments noted were chronic malaria, enlarged tonsils, defective vision, pyorrhœa, dental caries, skin diseases, and leprosy. In regard to leprosy the Director of Public Health stated, "as many as 93 students with leprotic patches as against 40 in the previous year were detected, out of whom a good number was found to be in the infective stage. The percentage of incidence among scholars works out at 2.2. It seems as if the disease is becoming as common as the other ordinary ailments. This menace needs the urgent attention of the authorities concerned."

In the Central Provinces routine medical examination of school children is conducted by assistant surgeons, assistant medical officers in charge of dispensaries and sub-assistant health officers on epidemic duty, monthly inspection reports being submitted to the Director of Public Health, through the civil surgeons.

In Bengal, 7,262 students underwent medical inspection in Calcutta in 1937, in other municipalities, 9,157 and in rural areas 5,099 pupils were examined. All serious defects were reported to the guardians of the students for appropriate action.

This brief review of school medical work indicates the inadequate provision which exists in every province. In devising methods of improvement it is necessary to remember that advance is more readily possible in urban than in rural areas, but advance in this branch of health administration is urgently necessary. Medical, Public Health and Education Departments must work together in order to produce an efficient scheme for school medical inspection and it is desirable that, in every province, a joint scheme should be prepared by these departments. While central co-ordination may be secured by close consultation between these departmental heads, the task of working the scheme of school medical relief must fall on local authorities and their public health advisers. In the larger towns and cities, members of the independent medical profession will be available, on the basis of part-time employment, for work as ophthalmologists, dental surgeons and paediatrists. On the other hand it is essential to have whole time school medical officers for routine examinations and for keeping records from year to year. In smaller towns financial reasons make such division of labour impossible and the services of a whole time medical officer with experience of diseases of the ear, nose, throat and eye should suffice. For the rural areas an advance on the present position will become possible only when the various experiments for expansion of rural medical relief, that are now in progress in the provinces, result in a wider distribution of medical practitioners through the country.

As regards the financial aspect of the problem, provincial Governments and local authorities must share the burden. At the same time, it is essential to secure co-operation of the parents of the school-going population in meeting a part of the cost. When a parent makes a small contribution, he not only helps towards the cost of the scheme but is also likely to take a greater interest in the medical service rendered to his children.

Fairs and Festivals.

43. The sanitary control of pilgrim centres as an essential part of the general campaign against infectious disease has been constantly stressed for many years past, and this has resulted in greater attention being paid to the health arrangements at these centres. Within more recent years, the sanitary control

measures in force have, in fact, reduced to a great extent the danger of explosive outbursts of cholera, which were previously the common sequel to many of the major festivals in the country. In this connection, the remarks made by the Director of Public Health, Bihar, in his report for 1937 are worth quoting :—

“ Most of these *melas* had caused in the past explosive outbreaks of cholera epidemic in this province, but with the growth of public health organisations in the districts and the provision of efficient conservancy arrangements with protected water supply, specially at the big congregations, the dread of quick dissemination of the disease in *mela* areas has been greatly reduced in recent years ”.

To effect satisfactory control, it is desirable that every provincial and State public health department should draw up definite and detailed plans for the sanitary control of all festival centres in their territory and that these plans should include clear instructions for the guidance of local officers responsible for the sanitation of individual festivals and for control of the routes likely to be used by pilgrims.

In the case of large fairs, like the Kumbh and Ardh Kumbh, which attract people from all over India and are therefore a matter of concern not only to the central but to all provincial and State Governments, public health demands special attention to three important objectives. These are :—(1) prevention of the importation of infectious diseases into the *mela* area, (2) prevention of the occurrence of these diseases amongst pilgrims attending the *mela* and (3) prevention of the spread of these diseases from the *mela* area to different parts of the country by returning pilgrims. This whole question was the subject of discussion at the recent meeting of the Central Advisory Board of Health, with particular reference to the control of cholera. Great stress was laid on the necessity for close co-operation between all parties including railway medical departments, and it may be of value to include here the resolutions passed by the Central Advisory Board of Health on this subject. These resolutions run as follows :—

(1) The Central Advisory Board of Health desires to invite the attention of all Governments in India to the recommendations made in the various Pilgrim Committee Reports prepared during 1913—16 and stresses the importance of implementing the recommendations contained in these reports, particularly in connection with the control of cholera.

(2) The Board expresses the emphatic opinion that all medical and public health departments should ensure that the supplies of anti-cholera vaccine employed are prepared from the true *V. cholerae*, so that inoculation will continue to give a high degree of protection.

(3) The Board further recommends that each Provincial and State Public Health Department should draw up definite and detailed plans for the sanitary control of all festival centres in their territory and that these plans should include clear instructions for the guidance of local officers responsible for the sanitation of individual festivals and of the routes likely to be used by the pilgrims.

(4) The Board recognises that control of the festival centres themselves is not likely to give complete protection from the danger of cholera and recommends the more general provision of protected water supplies and of adequate conservancy measures, particularly along the routes used by pilgrims.

(5) The Board, having discussed the question of protection conferred by anti-cholera inoculation, recommends that the possibility of introducing a system of compulsory inoculation of all pilgrims be examined by a sub-committee of the Board and that a report on this matter be submitted at the next meeting.

(6) The Board recommends close co-operation between the public health departments of neighbouring provinces and States in respect of any special precautionary measures which may be prescribed and particularly in regard to the cancellation of, or prohibition of attendance at a festival because of the danger of epidemic disease. The Board further suggests that local health officers in their respective provinces and States should make mutual arrangements for the rapid interchange of up-to-date and exact information regarding all outbreaks of epidemic disease.

As regards the festivals which took place in different provinces during 1937, in N.-W. F. P., C. P., Sind, Assam and Ajmer-Merwara, no gatherings of any great importance were held and no outbreak of epidemic disease occurred. In the other provinces, sanitary arrangements generally provided for cleanliness of the *mela* area, chlorinated drinking-water supplies, adequate numbers of sanitary conveniences, the control and protection of food-stuffs exposed for sale, the early detection of cases of infectious disease and the follow-up of contacts. In the Punjab, sanitary organisation and supervision were effected in every case by the district and municipal medical officers of health concerned and the fairs passed off uneventfully. In the United Provinces, the sanitary arrangements at the larger fairs were carried out by the assistant directors of public health, whilst the smaller fairs were controlled by the medical officers of health and their staffs. All fairs and pilgrimages passed off without any serious outbreak of infectious disease in epidemic form.

In Bihar as well as Orissa, where a large number of *melas* are held every year, many were solely of local interest and were attended only by inhabitants of the surrounding districts. In the former province, however, three *melas*, Pitripaksha at Gaya, Harihar Chetra at Sonapur and Bhadra Purnima at Deoghat were of more than local interest and attracted considerable numbers of visitors from other provinces. Adequate sanitary arrangements were made in all cases. In the latter province, the Snan and the Rathjatra festivals at Puri were attended by large numbers of pilgrims from within and without the province. As a preventive measure, all wells were regularly treated with cholera-phage and anti-cholera inoculation was practised intensively both among the pilgrims and among the residents of the festival areas, as many as 58,743 inoculations being performed. Although sporadic cases of cholera were occurring in Puri town before the fair opened, the incidence of cholera during the *mela* gave no cause for anxiety, only 12 cases in all being reported. Special arrangements existed for the prompt reporting of all cases of infectious disease by house owners and by medical practitioners and ambulance cars were available at different places, for the quick removal of patients to the cholera hospital. At another important *mela* in Chandaneswar, which was attended by about 40,000 pilgrims, no case of epidemic disease was reported.

In Bengal Presidency, adequate sanitary and medical arrangements for the Ganga Sagar Mela were made jointly by the district board and the public health department. Effective steps were taken to inoculate intending pilgrims against cholera and to vaccinate them against smallpox; only one case of cholera occurred, although the water supply was inadequate. At the Nungalbund *mela*, where nearly 90,000 pilgrims assembled, the district health officer and the Assistant Director of Public Health, Dacca Circle, carried out all necessary sanitary arrangements and took effective steps to prevent the sale of adulterated foodstuffs; only two cases of cholera with one death occurred.

In Bombay Presidency, the largest gathering occurred at the Ashadhi fair which took place at Pandharpur in July. In spite of the fact that cholera was raging in Satara district and that this disease had also appeared in East Khandesh, Sholapur and Poona districts, the attendance increased from 91,267 in 1936 to 159,777. Since the route, along which the pilgrims travelled, passed through cholera infected tracts, the provisions of the Epidemic Diseases Act were applied to Pandharpur and all non-inoculated persons were prohibited from entering the town during the fair period. Arrangements were also made for the free inoculation of all pilgrims who did not possess certificates indicating previous inoculation. About 73% of the pilgrims were inoculated; most of the others were able to produce evidence of previous inoculation. These and

the other measures practised were so successful that only one case of cholera and three of diarrhoea were admitted to hospital, these having been detected either before they entered the town or soon after their entry. Spread of infection was thus effectually prevented. At the other fairs, sanitary arrangements were adequate and all passed off uneventfully except for one case of cholera after the Nivritti fair at Trimbak.

In Madras Presidency, 680 festivals took place during the year. As usual, the sanitary arrangements at important festivals were supervised by the district or municipal health officers, whilst others of lesser importance were in the hands of the local health inspectors. All the festivals passed off without any serious outbreak of cholera, except for a few local outbreaks which were traced to returning pilgrims. Preliminary arrangements were in train for the great Mahodayam festival which takes place once every 20 to 30 years and which was due on 31st January 1938.

Health Propaganda.

44. The importance of health education in the campaign for improved national health has received recognition from health authorities all over the country. From the time that rural and urban health organisations began to be expanded about 10—15 years ago, the annual celebration of the "Health Week" by local authorities has been encouraged by public health departments as a means of focussing public attention on health questions. In several provinces, a separate organisation has also been built up in the office of the Director of Public Health for the preparation of suitable propaganda material and for the spread of health education. This is as it should be, because health propaganda is a highly specialised art and, if it is to be conducted on suitable lines, it must be entrusted to one who realises the difficulties and who knows how these are best overcome. "Publicity is a professional business, requiring quite different qualities from the work that it is designed to publicise. A good publicity campaign demands the most exacting team work in its preparation—just as exacting and thorough work as any other job of carefully planned organisation. It requires also certain qualities of artistry, and finally a touch of flair. You must be prepared, if your work is to be made the subject of publicity, to see that it is some one's responsibility to be looking at it from the publicity angle, and to entrust the execution of your publicity to professional hands. Even the simplest leaflet demands, if the most is to be made of it, expert writing, expert lay-out, and expert knowledge of typography and, it may be, of illustration and design."*

The problem of health education in India is complicated by the fact that the vast majority of the population is illiterate. Moreover, there exist certain age-long customs and habits which cannot be easily changed. Instances are the indiscriminate pollution of village sites with nightsoil and the indifference of the people to contamination of their water supplies. It is difficult to "get across" to the villager the fact that, in respect of many diseases, man is his own worst enemy and that a radical change of habits is essential if sickness and mortality arising from avoidable diseases are to be prevented. Both public health staffs and voluntary workers engaged in health propaganda continue their task in the face of much discouragement from the apathetic attitude of

* Quoted from a speech delivered at the 11th Annual Health Education Conference, London, January 1939, "The part which can be played by publicity and public relations work in making a healthier and fitter Britain" by Sir Stephen Tallents, Controller (Public Relations), British Broadcasting Corporation.

the people, but as will be seen from the succeeding notes on provincial activities, every modern method of propaganda, as far as available, is being utilised. The provincial reports indicate that hundreds of thousands of the people in both rural and urban areas are being brought within the scope of the educational campaign. Whilst the magnitude of the task is such that the results so far achieved may appear to be disappointing, it is only fair to add that several Directors of Public Health have expressed the opinion that distinct progress has been made in the general health education campaign.

In the North-West Frontier Province one of the functions of the travelling dispensaries, intended primarily for the extension of medical relief, is to carry a message of health to the rural population by means of posters, pamphlets and magic lantern lectures. Two travelling dispensaries were employed in 1937 and, as each visited over 800 villages and treated approximately 50,000 patients, these dispensary doctors had abundant opportunities of carrying out propaganda work.

The activities of the Punjab public health department in respect of health propaganda included the preparation and issue of a large number of posters, leaflets, pamphlets and models; intensive anti-hookworm propaganda in areas where surveys and treatment for this disease were in progress, a health exhibition at the Criminal Tribes Settlement, Moghalpura, and a series of 27 broadcasts on health subjects from the Lahore Radio Station.

In the United Provinces, the propaganda section of the office of the Director of Public Health is under the charge of an Assistant Director assisted by two assistant hygiene publicity officers, who are qualified medical officers of health. These officers are on the directing staff of the provincial branches of the St. John's Ambulance Association, the Junior Red Cross and Indian Red Cross Society. The Assistant Director of Public Health is also in charge of the school medical service. It is reported that the close relationship between official activities in respect of school medical work and health education and those of voluntary organisations engaged in the promotion of health has been of great advantage in securing co-ordination and continuity of effort.

The number of schools with Junior Red Cross groups was 3,851 in 1937 against 3,416 in 1936, about 94·5 per cent. of these being in rural areas. The number of Junior Red Cross groups also increased from 4,576 in 1936 to 5,025 in 1937. Their activities covered, in different schools, a wide range including the writing of health essays, preparation of health posters, charts, models and exhibits, the celebration of health weeks, participation in the distribution of cinchona and quinine tablets during malaria epidemics and assistance to health authorities during outbreaks of cholera and plague in carrying out preventive measures. First-aid in cases of snake-bite, dog-bite, drowning and accidents, assisting villagers in filling up excavations and in cleaning cattle sheds and participation in flood relief work formed other types of useful social activity for juniors in different parts of the province. The importance of such training can hardly be overestimated; there can be no better method of training a boy to be socially minded and of encouraging him to contribute his share to the common welfare in the later years of his life.

The Director of Public Health reported that at the close of the year the activities of the St. John's Ambulance Association were in force in 22 districts, two estates and 46 police centres; a total of 2,113 members, of which 666 were in the police force, were trained in first-aid; in addition, 5,808 school boys were trained for the Mackenzie School Course Certificate; and 16 cadet and four

brigade divisions were in existence. A training camp for the officers of these divisions and members of brigade divisions was held towards the close of the year.

Health education work was carried out by the public health department throughout the year along the usual lines, including magic lantern lectures, cinema shows, distribution of leaflets, etc. A publicity van fully equipped with propaganda material covered a distance of 4,259 miles and 88 cinema demonstrations were given to approximately 85,000 persons. The opportunities afforded by industrial and agricultural exhibitions were also utilised for health propaganda purposes.

In Bihar, health propaganda is directed by an organised public health bureau in the office of the Director of Public Health. The bureau is responsible for the production of all material such as leaflets, posters, lantern slides, etc., and for its distribution to local bodies and other interested organisations.

A health museum, organised by the provincial branch of the Indian Red Cross Society, has been located at the Government museum in Patna; this was open to visitors throughout the year.

Propaganda on the subject of tuberculosis was carried out by distributing two thousand copies of an Urdu translation of a pamphlet entitled, "The Tuberculosis Problem in Bihar and Orissa".

In Bengal, a publicity branch of the office of the Director of Public Health is in charge of health propaganda. Twelve 'touring cinema parties' are maintained and the tour programmes of these 'parties' are drawn up by District Health Officers in consultation with local officers. The health films, which are said to help effectively in the spread of health knowledge among the rural villages, deal with such subjects as malaria, cholera, leprosy and child welfare and, during the year, new films were prepared on village sanitation and smallpox. An exhibition van maintained by the public health department carried out a campaign in six districts. The department also took part in organising the annual health exhibition held in Calcutta during the Health and Baby Week.

In Assam, assistant surgeons of the public health department, during the course of their inspections of rural dispensaries, gave health talks illustrated with lantern slides. The expenditure was met partly from the public health budget and partly from the King George Thanksgiving (Anti-Tuberculosis) Fund because propaganda on the subject of tuberculosis was conducted along with that on other diseases.

In Orissa, the public health staff kept up a continuous campaign for health education as part of its routine duty. Propaganda on health subjects was carried out in 8,032 villages and in almost all the towns of the province, a total of nearly eight lakhs of people being included in this educational effort. The public health budget provided adequate funds for this work, but full advantage could not be taken of the allotment because an Assistant Director of Public Health, who was to be placed in charge of this work, could not be appointed during the year.

In Madras Presidency, the post of a propaganda officer has been in existence in the office of the Director of Public Health for the past 12 years. He is responsible for the production of propaganda material, including cinema films on health subjects, and for directing health education to be carried out

by the health staffs of rural and urban areas. The Director of Public Health summarised his activities in respect of health propaganda during 1937 as follows :—

1. Lecture with magic lantern demonstrations	24,979
2. Lecture and short talks	183,035
3. Cinema shows	990
4. Health dramas	952
5. Health exhibitions	1,903
6. Demonstrations by ballad singers	90

It is stated that a total of nearly 93 lakhs of people attended these events. These figures are impressive, but it would be wrong to assume that every person in a large audience attending a cinema show or a lantern lecture is sufficiently impressed by what he sees or hears to give up at once undesirable habits to which he has been long accustomed. The process of education is much longer and much more laborious. At the same time in so far as recurring occasions, through systematic propaganda, afford the citizen opportunities for recognising the desirability of change, it may confidently be expected that satisfactory results will eventually be obtained. In this connection the Director of Public Health states that "There can be no doubt that considerable progress has been made in educating the public on matters relating to health".

In Bombay, a number of voluntary associations are engaged in health propaganda. These organisations include the Bombay Presidency Baby and Health Week Association, Sanitary Associations at Bombay, Broach, Ahmedabad and Dhulia and District Branches of the Red Cross Society at Broach and Ahmedabad. It is reported that all these institutions carried out systematic propaganda on different health subjects. In addition, some took an active part in promoting child welfare work, whilst the Bombay Presidency Baby and Health Week Association was also engaged in nutrition research. The medical officers of three travelling dispensaries under the Red Cross Society carried out propaganda in the villages of Kanara, Belgaum and Bijapur districts, which they visited to afford medical relief to the people.

In Sind the health education campaign was conducted by (1) the public health department, (2) the provincial branch of the Indian Red Cross Society and (3) the Karachi Health Association. The activities of this last body are briefly described in Section X (page 221). The provincial organiser of the Red Cross Society visited 52 towns and villages and 80 Junior Red Cross groups during the year and gave lectures at these places. The Society also held a Red Cross Week and Health Exhibition.

Propaganda carried out by the public health department was directed mainly towards educating the people on the subjects of malaria and tuberculosis. Advantage was also taken of a swadeshi exhibition at Karachi and an Agricultural-cum-Industrial exhibition at Hyderabad to educate the public in hygiene by arranging a stall equipped with models and charts.

Adulteration of Food.

45. Adulteration of the common articles of food is widely practised in India and the attention which has so far been devoted to this subject by health authorities has been wholly inadequate in relation to its importance. As will be seen from the brief notes contained in later paragraphs in respect of individual provinces, such important articles of food as milk and milk products

are everywhere subject to a large degree of adulteration. One of the causes of this deplorable state of affairs is the almost complete apathy with which the public view the matter. As has been pointed out by the Public Analyst to the Government of Madras, "Not only do the general public show no active resentment against the food vendors who are regularly swindling them but, on the contrary, there appears to be a body of opinion which is actually prepared to co-operate against the authorities who are doing their best to suppress a system of wholesale fraud". Education of the general population would therefore seem to be essential if success is to be achieved in any campaign against food adulteration.

Apart from a campaign of this kind, however, certain improvements in administration would seem to be equally necessary. Generally speaking, the executive functions of local authorities are vested in elected chairmen, who are subject to continual pressure from their electors. It is not therefore surprising that, in the absence of a strong public demand for the suppression of food adulteration, local authorities fail to prosecute offenders with any vigour. "No small part of local government is definitely expert administration in which general opinion is only valid upon large issues of policy on the one hand and finance on the other".* In other words, for successful routine public health administration, the health officer should be entrusted with executive powers. In the introductory paragraphs of this section reference has been made to the recent public health legislation in Madras which has transferred all the executive health functions of local authorities to their health officers. This should effect improvement in public health administration generally including the control of production and sale of articles of food and is a change which may be commended to all other provinces.

The following paragraphs contain a brief review of the action taken in the various provinces in respect of the control of food adulteration.

In the North-West Frontier Province 189 samples were examined for adulteration during the year under review, 145 of ghee and 40 of milk. Adulteration was found in 41% of the samples of ghee and in 52% of those of milk.

In the Punjab, 71 local bodies have adopted the Punjab Pure Food Act. In 64 of these, the public health chemist of the provincial laboratory acted as their public analyst, whilst seven municipal or small town committees employed their own analysts.

A reduction in the fee of the provincial laboratories for examination of ghee and butter from Rs. 15 to Rs. 5 per sample was followed by a large increase in the number of samples sent for analysis, the number examined being 865 as compared with 209 in 1936. The results of the analysis of the three most important articles of food, which formed the bulk of the samples, are given below :—

	No. of samples.	Percentage found adulterated.
Ghee	691	73 per cent.
Milk	89	50 per cent.
Butter	17	40 per cent.

* "A Grammar of Politics" by Harold J. Laski (1930), George Allen and Unwin, Ltd., London.

In Lahore, Amritsar and Rawalpindi, which have their own analysts, the numbers of samples examined during the year were 2,027, 963 and 766 and the percentages of adulteration for the same three food articles were 47, 27 and 17 respectively.

In Delhi, 250 samples were examined during the year, of which 111 were ghee, 8 butter and 131 milk. The percentages of adulteration were 72·9, 37·5 and 66·4 respectively.

In the United Provinces, the provisions of the Prevention of Adulteration Act were in force in 85 municipalities, 38 notified areas, 17 cantonment areas and different town and rural areas in 38 districts. The chief articles of food sampled were ghee, milk, flours and edible oils and out of 10,225 samples received approximately 22 per cent. were adulterated. The number of persons prosecuted under the Act was 1,993 and the average fine inflicted amounted to Rs. 37·28. The Director of Public Health stated that the punishment awarded by some of the magistrates was deterrent. Another interesting fact is that, during the past few years, a steady increase has taken place in the number of samples examined, the figure for 1937 being nearly double that of 1933 (5,120).

In Bihar, important foods analysed were ghee, mustard oil, milk and *atta* or wheat flour; the percentages of adulterated samples were 52·9, 13·0, 65·2 and 0·08 respectively.

During 1937, Orissa had no public health laboratory of its own, articles for chemical and bacteriological examination being sent either to Patna or to Guindy. Towards the close of the year the establishment of a laboratory was sanctioned by Government and it was expected to start functioning at an early date. In 1938, "The Orissa Prevention of Adulteration and Control of Sale of Food Act" was passed, replacing the provisions of similar Acts of Madras, Central Provinces and Bihar and Orissa, previously in force in the parts of these three provinces, which were amalgamated when Orissa was formed. The Director of Public Health has pointed out that the Act "covers new ground and embodies better provisions to meet all reasonable requirements for effecting control of storage, distribution and sale of various foods and drinks in the province" and that an encouraging feature was the strong support which public opinion accorded to the new legislative measure. The hope is added that the campaign against food adulteration will be taken up with vigour by all local bodies.

The number of food samples examined during the year was 267, an increase of 32 over the previous year's figure. The chief articles examined were the same as those in Bihar and high percentages of adulteration were recorded except for *atta*.

In Bengal, examination of articles of food was carried out in the Government public health laboratory in Calcutta, at its branch at Dacca and in four district laboratories at Jessore, Khulna, Rajshahi and Rangpur. From July 1937, in accordance with an order of Government, the public health laboratory at Dacca was relieved of its functions in regard to food adulteration.

In all these laboratories, most of the samples examined were those of mustard oil, possibly because of the suggested association between the use of this oil and the incidence of epidemic dropsy, a disease widely prevalent in Bengal. In regard to milk and milk products, high percentages of adulteration were recorded and the Director of Public Health stated that adulteration of these foods "remained unaffected by such efforts as were being made for

combating it". The numbers of samples taken of articles of food other than mustard oil, were not nearly large enough to effect any reduction of adulteration.

In Assam, 465 samples were examined as compared with 706 in 1936, milk, ghee and mustard oil forming 84 per cent. of the total. Of the milk samples, 34 per cent. were adulterated, ghee 54 per cent. and mustard oil 5 per cent.

In Bombay Presidency, the Prevention of Adulteration Act was in force only in Bombay City and the towns of Ahmedabad, Surat and Broach. Except for 16 samples of tea, sampling was confined to milk, ghee and butter; the percentages of adulterated samples ranged from 51 to 87 per cent. The Director of Public Health stated that adulteration of foodstuffs was on the increase and that the practice was also spreading to rural areas. Extension of the provisions of this Act to other municipalities and vigorous enforcement of the law are urgently required.

In Madras Presidency, the Food Adulteration Act is now in force in 70 municipalities, including Madras City. All municipalities having health officers or other responsible officials such as executive officers have been brought into the scheme; in addition, 17 *panchayats* have been included. The public analyst has pointed out that the inclusion of *panchayats* has been made as an experimental measure because "when a sanitary inspector is left to work without strong direction from a senior officer, local pressure makes efficient sampling of the more influential traders a difficult task". With this extension of the Act to *panchayats* it is expected that approximately 8,000 samples will be examined every year in the province. Including Madras City, 7,017 samples of various kinds were examined in 1936-37 and, of these, 39.1 per cent. were adulterated, the corresponding figures for 1935-36 being 6,581 and 37.9 per cent. The following table presents comparative figures (exclusive of Madras City), for three consecutive years, in respect of certain staple articles of food.

Nature of samples.	1934-35.			1935-36.			1936-37.		
	Total.	Adulterated.	Percentage adulterated.	Total.	Adulterated.	Percentage adulterated.	Total.	Adulterated.	Percentage adulterated.
Ghee	1,208	535	44.3	1,367	452	33.1	1,510	484	32.1
Butter	150	76	50.7	212	89	42.0	230	93	40.4
Milk	1,708	1,137	66.6	2,080	1,398	67.2	2,777	1,664	59.9
Gingelly-oil	1,791	446	24.9	1,528	166	10.9	950	93	9.8
Other samples	519	100	19.3	388	73	18.8	511	103	20.2
Total for each year	5,376	2,294	42.7	5,575	2,178	39.1	,978	2,437	40.8

These figures suggest that a steady decrease has occurred in the adulteration of these important foods. Milk is the most heavily adulterated article and the large increase in the number of milk samples during 1936-37 is responsible for the small rise in the percentage of adulteration for all articles of food in comparison with the previous year.

Housing.

46. Some of the salient features of the housing problem in rural, urban and industrial areas of India were discussed in last year's report. The suggestion was made that the subject demanded long-term planning and that all interested parties, including provincial Governments, local authorities and employers of

industrial labour should participate in the preparation and execution of an agreed policy of improvement. It was also pointed out that the village, the small town and the city presented different problems and the lines on which suitable action might be taken in each case were also indicated. In addition, such information as was available from Directors of Public Health regarding provincial housing schemes was also incorporated. An attempt has been made to supplement the facts given last year, but no additional information is available with respect to the North-West Frontier Province, Punjab, Central Provinces, Bombay, Sind, Coorg and Ajmer-Merwara. A paragraph has been added summarising the progress achieved in industrial housing.

In Delhi province, little can be recorded in respect of rural housing except that efforts were continued to effect improvements in lighting and ventilation as a routine part of the programme of village improvement. In urban areas apart from the usual control exercised by municipal authorities over the erection of new buildings, the most notable advance was the formation of an Improvement Trust in Delhi with the object of developing new areas and of clearing existing slums. Some progress was made in the development of new areas.

In the United Provinces, it was reported that improvements had taken place in the general design of houses and that most modern houses were now built with due regard to ventilation, light and sanitation. The Improvement Trusts in Cawnpore, Lucknow and Allahabad were carrying out improvements by acquiring the most congested portions of the cities, by demolishing old houses, by laying out good wide roads and by making provision for other amenities. Town extensions were also planned for the relief of congestion.

In Bihar, reconstruction schemes for the towns of Dharbhanga and Monghyr were sanctioned after the earthquake in 1934, in order to provide wide roads, markets, open spaces and other amenities. No substantial progress was made in the execution of these schemes during the year under review.

In Orissa, in rural areas, no law exists to ensure the building of houses on approved plans and villages are permitted to develop in haphazard fashion. In urban areas, whilst the municipal act gives certain powers to municipal boards for the control of house construction, these powers are seldom exercised.

In Bengal Presidency, the Director of Public Health drew attention to the necessity for a Village Planning Act because of the haphazard growth of home-steads with innumerable mosquito breeding places caused by indiscriminate excavations. In urban areas, congestion was reported to be increasing, whilst the same tendency towards haphazard development was noticeable.

In Madras Presidency, most municipal and many rural towns suffer from congestion. The activities of co-operative building societies were being encouraged by the advance of Government loans and several societies in urban areas were functioning actively. These societies advance loans for the construction of houses and recover the amounts in easy instalments. Railway administrations, and a number of large industrial concerns and plantations provided housing accommodation to their labourers. A few municipal councils have also constructed quarters for their conservancy staffs.

In Assam, housing conditions in urban areas continued to be unsatisfactory, the houses being generally ill-designed and the lay-outs ill-planned with resulting overcrowding. In rural areas, conditions were worse, particularly in the low lying areas which are liable to floods. No building societies or co-operative housing schemes existed in the province during the year under review.

Industrial housing.—Housing schemes for industrial labour are making slow progress in the different industrial centres of the country. In the United Provinces, 600 new quarters were constructed, sugar factories being responsible for the bulk of these, 18 quarters were built by the Cawnpore Improvement Trust and 500 tenements by private persons in factory areas. In addition, 70 acres of land were sold for the construction of a workers' settlement. In Madras, free housing accommodation was provided for workers in four factories; 46 quarters were constructed at Tuticorin and 50 at Mandapam; housing facilities were increased in one of the jute mills at Vizagapatam and quarters at very low rents were provided by one mill in Coimbatore. In Assam, progress was made in the replacement of thatch and wattle and *katcha* houses by buildings of better material and design; many industrial concerns continued to replace the 'barrack' type of accommodation with detached units which ensure greater privacy; the River Steamers Workshops at Fenchunganj in Sylhet constructed eight ferro-concrete blocks, each of three houses; and the Assam Oil Company provided further quarters for its workers. In Bengal, the housing of factory operatives and their living conditions were much the same as in previous years; the Indian Iron and Steel Company provided two *pucca* mess rooms, 150 tiled houses and 12 blocks of quarters each containing ten units for their workers and several jute mills extended their housing accommodation. In Bombay Presidency, the municipality of Bombay spent Rs. 2,89,000 on the construction of 516 semi-permanent rooms as part of their slum improvement and housing schemes; the Ahmedabad Mills Housing Society built 435 tenements; the Ahmedabad municipality put up 100 tenements at a cost of Rs. 50,000, Majur Mahajan Sangh spent Rs. 75,000 on 125 two-room tenements; and 350 tenements were built on the hire-purchase system by the Pritampur and Gajanand Societies in Ahmedabad. At Ahmedabad, the best accommodation found for industrial workers was provided by the Electricity Company at Sabarmati Power House.

Industrial Hygiene.

47. Since the Royal Commission on Labour in India issued its report nearly eight years ago, increasing attention has been paid to the conditions of life of factory workers not only by governments and legislatures but by the general public. The progress achieved in implementing the Commission's recommendations and a review of some of the more pressing health problems associated with industrialisation were set out in last year's report.

In most provinces, officers of the public health departments have now been appointed as additional inspectors of factories. In certain provinces, this additional function has been given only to Assistant Directors of Public Health, but in other cases both district and municipal health officers have also been invested with the powers of inspectors of factories. Their inspections are mainly directed towards ascertaining the adequacy or otherwise of the provisions for lighting, ventilation, water supply and sanitation in the factories and towards the satisfactory maintenance of such provisions. In order to secure uniformity of administrative action, the health officers' recommendations are communicated to the circle factory inspector or to the Chief Inspector of Factories. These officers then take appropriate action with the managements concerned to secure rectification of reported defects.

Factories.

The Factories Act of 1934 has now been in force for three years. This Act, it may be remembered, provided among other things for (i) reduction of the maximum weekly working hours for adults, women and children,

(ii) protection of workers against serious discomfort due to high temperatures in factories, (iii) tests of stability of factory buildings, etc., and (iv) protection from industrial disease. During 1937, the total number of factories registered under the Act increased to 9,863, which exceeds that for 1936 by 674 and is the largest ever recorded. The number of factory operatives employed increased from 1,562,917 in 1936 to 1,675,869 in 1937, constituting an increase of 7.2 per cent. and another record figure. Women and children employed numbered 232,122 and 10,833 respectively, showing an increase of 4.2 per cent. in the former category and a decrease of 9.4 per cent. in the latter. The reduction in the total of child labour is a matter for satisfaction, although in Madras and United Provinces appreciable increases in these numbers were registered. The recorded increase in the number of women workers has not been proportionate to the rise in the total factory population. In Bengal, prosecutions were instituted for illegal employment of women on Sundays and of adolescents and children not possessing the requisite medical certificates.

The number of accidents increased in 1937, the figure being 28,323 as against 24,376 in 1936. Minor accidents are reported to have accounted for 3,372 and serious accidents for 577 of this increase. It is stated that "greater use of the Act, with an increase of registered operatives, helps to justify the general view that better reporting was responsible for the higher figures."

Slow progress is being made in respect of housing schemes for industrial labour in the different industrial centres of the country. In order that all available information regarding housing for the civil population may be presented in consolidated form, all details in respect of industrial housing have been included in the paragraph on "housing" to be found on page 108.

The health of factory workers is reported to have been generally satisfactory in nearly every province although, in common with the rest of the population, industrial labour suffered from the prevailing infectious diseases. Sanitary arrangements were reported to be on the whole satisfactory, but in Assam, Bombay, Bengal, the Central Provinces and Berar, Orissa, Sind and the United Provinces, substantial room for improvement still exists, particularly in the smaller industrial concerns. The supply of drinking water in the factories of Bombay Presidency was generally adequate, except in Ahmedabad where individual mills had to undertake their own borings. In the United Provinces, the question of satisfactory disposal of effluents from the sugar mills still presented a difficult problem, although efforts were being made to cope with each case as local conditions indicated. The expansion of finishing processes in the Ahmedabad textile industry accentuated the problem of the disposal of trade wastes.

Air conditioning appears to be gaining in popularity in Bombay, more especially in weaving sheds. Various other improvements such as plants for removal of dust, vacuum cleaning for printing presses and ridge ventilation for seasonal factories appear to have been adopted in different parts of the country. Considerable progress in ventilation was made in tea-garden factories in Bengal following the issue of new rules regulating the hot-air exhausts from tea-drying machines.

Welfare work in different parts of the country included educational facilities for the children of workers, extension of medical services, promotion of co-operative societies, provision of facilities for sports and recreation, free supply of milk to children and the grant of maternity benefits to women. The following details may be of some interest. In Madras Presidency, both

tea estates and other large industrial concerns continued to improve their medical arrangements. In Hospet, a co-operative society was maintained for the workers by the management of a large sugar factory and the same company contributed to the encouragement of outdoor recreation, whilst a sports club was opened by a cement company in Coimbatore district. In Bengal Presidency, a number of jute mills adopted maternity benefit schemes in accordance with the requirements of a Bill on this subject. In the United Provinces, a saddlery factory organised a sports club and a first-aid dispensary. In Delhi, the Delhi Iron Works continued to give free milk to their workers. In Bombay Presidency, the Government published rules requiring the provision of crèches in factories employing 100 or more women. The Bombay Presidency Baby and Health Week Association held 15 exhibitions which were fairly well attended by workers and their families and some mills appointed or contemplated the appointment of welfare officers. In Assam, two up-to-date hospitals were built on a tea-estate; the Assam Oil Company opened a lying-in hospital; the Budla Beta Tea Company introduced with success the use of light shoes on all its estates as a protection against injury and infection, whilst most of the tea concerns gave medical treatment, maternity benefits and free supplies of milk to young children.

Mines.

Asansol Mining Settlement.—In the Asansol Mines area, healthier conditions prevailed during the year under review. Decreases occurred in the death rates for all ages including infants, whilst the upward trend in the recorded birth-rate noticed in 1936 continued to be maintained. The recorded death rate in the colliery population was considerably lower than that of the general population and both the upper and lower limits of the monthly death-rate were lower than those of the previous year. The rise in fever mortality in September and the following months coincided with seasonal increase of malaria. Cholera accounted for 252 cases and 85 deaths but the majority of cases were sporadic in nature and no epidemic occurred. Due precautions were taken in the form of isolation of cases, segregation of contacts, adequate disinfection and protection of water supplies. Inoculation with anti-cholera vaccine was carried out in anticipation of an outbreak and also during the course of the disease, the total number of persons inoculated being 30,826, of whom half were miners and members of their families. Only 92 cases of smallpox were recorded during the year under review against 925 in 1936. Vaccination and revaccination were widely practised, particular attention being paid to imported labour. Of the latter, large numbers were either wholly unprotected or had lost protection conferred by primary vaccination during childhood. Altogether 64,669 vaccinations were performed; these included 16,331 primary and 48,338 revaccinations.

A special survey of the incidence of leprosy among school children was undertaken. Of 6,949 examined, 2·3 per cent. were found to be suffering from leprosy. Of 5,332 known cases, 3,402 received treatment in 14 leprosy clinics and a staff of four leprosy officers and 13 trained assistants continued to be maintained jointly by the Asansol Mines Board of Health and the Leprosy Relief Association.

The Asansol Mines Board of Health carried out successful anti-malaria operations in three very malarious areas; the results obtained in one of these areas were however limited in extent, owing to the presence of a large number of subsidences and abandoned pits and to the restricted nature of the anti-malarial campaign.

In the Asansol Mines area, the number of health visitors for maternity and child welfare work increased from six to seven, each health visitor being in charge of an area extending over four square miles, including collieries and villages. These health visitors visited 1,022 expectant mothers at their homes. Thirty-eight cases were confined by the health visitors, 86 by trained *dais* under the personal supervision of the former, whilst 773 confinements were conducted by trained *dais* alone. Training classes for indigenous *dais* were organised in eight centres and an intensive course of training was held for three months. Certificates were being introduced in order to bring home to the general public the difference between a trained and certified *dai* and an untrained *dai*. Confinements followed up by the health visitors during their post-natal visits numbered 1,485 whilst the four infant welfare centres maintained by the Board were attended by 179 infants and 169 toddlers and the mothers were given a course of health talks. A Baby Week was organised by the Asansol Health and Baby Welfare Society in eight centres, and adequate training was arranged for boys in first aid and for girls in first-aid, home-nursing and mother-craft.

Jharia Mining Settlement.—The Jharia Mines Board of Health controls the sanitation of Jharia and neighbouring areas, covering the whole of Dhanbad sub-division with the exception of Dhanbad municipality. For an estimated population of over 500,000, recorded births numbered 14,791 and deaths 8,320, the birth rate being 27·6 and the death rate 15·5 *per mille*, as compared with 25·9 and 16·1 in the previous year. Cholera accounted for 27 cases with 14 deaths, nine of these deaths occurring on the collieries. The total number of anti-cholera inoculations performed was 2,900. Suspected smallpox cases decreased to 418 with six deaths from 3,733 cases with 329 deaths in the previous year. Samples of foods analysed in the Board's laboratory numbered 889 and prosecutions were launched in all cases of proved adulteration. The five years' housing programme enforced by the Board during the previous year with a view to improve colliery housing was continued. Propaganda work on leprosy, maternity and child welfare, general hygiene and sanitation and ventilation in mines was carried out. A leprosy hospital at Tetulmuri was opened and 815 new patients were treated, the total number of treatments given being 28,711. Work in connection with child welfare was continued on previous lines.

In Madras Presidency, district health officers of the mining districts inspected 85 mines and sent their inspection notes to the respective Collectors. The reports of five district health officers in the same Presidency, who are also *ex-officio* Inspectors of Mines, were sent to the Chief Inspector of Mines, Dhanbad; the sanitary defects pointed out in these reports were being gradually remedied by the proprietors concerned. In the Punjab, the medical officers of health of the districts where mines are located have now been appointed additional inspectors of mines. These officers inspected the sanitary conditions of 29 mines and their inspection reports were sent to the Chief Inspector of Mines, Dhanbad. The sanitary defects pointed out in those reports were generally rectified by the proprietors. In the Central Provinces the main colliery hospital at Parasia and the dispensaries at the Mahakali and the Ballarpur collieries continued to supply medical aid to the labourers. The Central Provinces Manganese Ore Company, Ltd., continued to maintain their dispensaries at three centres; it was suggested to the company that, in the interests of their women workers, they should employ nurse midwives with experience of infant welfare work at the dispensaries. In Assam, the Civil Surgeon, Naga Hills, inspected the sanitary conditions of Borjan Colliery, but the Civil Surgeon, Lakhimpur, and the Assistant Director of

Public Health, Assam Valley Division, who are also *ex-officio* Inspectors of Mines, did not inspect any mines during the year under review. In Bombay Presidency, the Assistant Director of Public Health, Northern Registration District, inspected the Manganese Mines and forwarded a report to the Chief Inspector of Mines in India, Dhanbad.

Railways.

48. In last year's report mention was made of the fact that railway administrations have important functions to perform in respect of the practice of preventive medicine. For instance, their active co-operation with provincial governments and local authorities is essential in the prevention of the spread of epidemic diseases and in the sanitary control of fairs and festivals. The Central Advisory Board of Health at its inaugural meeting discussed the need for mutual planning in regard to those health problems of common interest to the civil, military and railway communities and, in a later memorandum on this subject, it has been suggested that every Director of Public Health should prepare, in conjunction with the railway health authorities, lists of all areas where co-operative action for the improvement of health conditions is required. The further suggestion has been made that this co-operation can best be ensured by the formation of local health committees, representative of all interests. Whilst these committees need not necessarily have any executive power, each should serve as a valuable clearing house for ideas and as a forum in which the combined welfare of the different communities concerned can be discussed and advanced.

The Central Advisory Board of Health at its meeting in January, 1939, accepted the suggestions made in the memorandum and it is hoped that these proposals will now be acted upon in every province. As a matter of fact, progress in this direction has already been affected by the North-Western Railway authorities, who have issued instructions to their railway medical staff to effect the necessary co-operation with both civil and military authorities in respect of anti-malaria measures.

Another important health problem, *viz.*, that of tuberculosis has been discussed by the medical section of the Indian Railway Conference Association in respect of its incidence in railway colonies. This Conference reported that :—

“The treatment of tuberculosis is one of the most perturbing medico-social problems in India. It is not a purely medical one but is intimately connected with the question of improved nutrition, housing, sanitation and personal hygiene. The period required for cure or arrest is usually prolonged and during this period the chief difficulty is to provide rest, complete or partial, for the sufferer and adequate nutrition and housing for him and his family. In the state of present knowledge purely medical requirements are small and comparatively inexpensive. Relapse is likely to occur if satisfactory conditions as regards nutrition, housing, etc., are not maintained.

“It will thus be seen that the problem is a national one which no individual commercial undertaking can hope to solve, unless its efforts are part of a national movement.”

Here again, the suggestion is that joint consultation between civil and railway health departments is necessary for the formulation of co-ordinated action.

Medical aid to railway employees and their families, training in first-aid, anti-malarial operations, protection of water supplies, precautionary measures against the spread of infectious disease from important fairs, the development of maternity and child welfare centres—these and other questions continued to receive attention at the hands of the railway medical services. A brief summary of the activities in a number of railway administrations is given in the following paragraphs.

North-Western Railway.

The medical and sanitary organisations catered for a staff numbering 100,432. The number of cases treated by the medical staff totalled 668,722 and 389 labour cases were conducted. Malaria accounted for the largest number of cases treated, *viz.*, 99,765 ; other diseases were trachoma 14,492, dysentery 8,876, influenza 7,913, tuberculosis of the lungs 353 and enteric fever 609. Of the infectious diseases, smallpox cases totalled 335 and cholera cases 12. As a preventive measure, 365 employees were placed under house quarantine on account of infectious diseases and 16,588 vaccinations against smallpox, 1,544 inoculations against cholera and 15 anti-plague inoculations were performed. The occurrence of cases of infectious diseases was notified by telegram to the civil and military medical and health authorities concerned.

Days of certified sickness among employees totalled 469,137, whilst 242 employees were invalided from the service, this number including 49 cases of tuberculosis of the lungs.

The Child Welfare Association carried on its activities in eight centres and three sub-centres. A total of 12,963 visits to ante-natal cases, 26,244 visits to infants, 36,194 to toddlers, 14,294 friendly and 12,833 casual visits were paid. These included 7,476 home visits to ante-natal cases, 14,634 home visits to infants and 16,913 to toddlers ; in addition 560 confinements were supervised.

Medical inspection posts were established at important stations for several weeks during the Kumbh Mela at Hardwar. Other inspection posts were also maintained jointly by the railway and civil public health authorities at Saharanpur, Khanalampura, Ambala Cantonment and Amritsar, the isolation arrangements at these places being made by the civil authorities whilst those for transportation were made by the railway authorities. Three inspections posts were also maintained by State authorities.

The system of collection of vital statistics was reviewed and revised arrangements were introduced.

First-aid training continued to be a compulsory subject in the syllabus for the course of training at the Walton training school and 41 classes in first-aid and two in home-nursing were held under the auspices of the St. John's Ambulance Association. A total of 567 candidates was trained in first-aid and eight in home-nursing ; of these 413 received first-aid certificates, 54 vouchers, 14 medallions, 41 labels, six home-nursing certificates and eight pendants.

Bombay, Baroda and Central India Railway.

For a total staff of 64,161, the number of days of certified sickness totalled 400,144, a considerable reduction as compared with the previous year. The number of cases treated in hospitals and dispensaries was 378,190 and these included air-borne diseases 70,386, food and water-borne 47,339, insect-borne 54,901, infectious diseases 1,078, pyrexia of uncertain origin 14,211, diseases of direct contagion 903 and food deficiencies 237. Enteric fever was responsible for 222 cases, influenza 13,939 and rheumatic fever 108. Only five cases of cholera with one death occurred whilst no case of plague was recorded. One hundred and ninety six cases of smallpox, with 12 deaths, occurred amongst employees and their families and other persons living within railway areas. Of these 90 were vaccinated and 106 unvaccinated,

and whilst 11 deaths occurred amongst the latter only one fatality occurred in the former group. As preventive measures against infectious disease, 3,894 primary vaccinations and 8,469 revaccinations against smallpox were performed and 371 anti-typhoid, 11 anti-plague and 1,455 anti-cholera inoculations were given. At the Ajmer anti-rabic treatment centre, 219 persons received anti-rabic treatment; one severe case ended fatally.

A considerable amount of anti-malarial work was carried out during the year. The total numbers of primary and relapse cases of malaria reported amongst employees during the last three years were as follows :—

	Primary.	Relapse.
1935-36	11,635	10,086
1936-37	7,900	8,900
1937-38	9,182	8,197

The increase in primary cases this year is reported as being due to abnormal rainfall in Gujerat and Rajputana.

Satisfactory medical and sanitary arrangements at fairs continued to be made. The Kumbh fair at Brindaban, which was held in the months of February and March, 1938, attracted thousands of pilgrims from all over India. The total numbers of pilgrims cleared through the medical inspection barriers were 257,713 incoming and 227,206 outgoing; the medical inspection arrangements were reported to be adequate.

Thirty-two classes in first-aid, including two in junior and two in home nursing, were held and 513 persons underwent training. Of these 271 obtained certificates, 55 vouchers, 19 medallions and 11 labels.

Madras and Southern Mahratta Railway.

General sanitation was maintained at a fairly high standard throughout the year. For a total staff of 47,757, the number of days of certified sickness totalled 396,817. Amongst infectious diseases, plague was present in epidemic form principally in the Kolar Gold Field area and in North Arcot district, but these outbreaks did not attain the large dimensions previously experienced.

In close co-operation with a special Government plague officer, intensive anti-plague measures were carried out and the inoculation of all staff and dependents resulted in rapid abatement of the outbreak without undue interference of traffic, whilst no case occurred among the railway population. As regards cholera, which was reported from all civil districts, preventive inoculation of the railway populations living in affected areas was carried out and every care was taken to safeguard water supplies. At Perambur and its environs, where one outbreak presented unusual administrative difficulties, special measures were adopted by placing an embargo on markets and on food vendors within the railway colony. Anti-cholera inoculations numbered 11,161. Smallpox was ubiquitous throughout the railway system, but the immediate action taken in every case resulted in the absence of any epidemic. A total of 3,705 vaccination and revaccination operations against smallpox was performed.

Forty-five stations remained under special malaria control and the malaria returns showed a steady improvement.

The leprosy clinic, whose inauguration and initial development was mentioned in last year's report, has now been working for over a year and the first annual review is reported to be encouraging. Additional patients since the clinic was opened numbered 107 employees, 55 dependents and five suspected cases. It is still too early to form a conclusive opinion as to the final effects of the treatment afforded, but the facilities granted and the encouragement and advice offered to those employees and their dependents augur well for the future. It was noticed that children reacted extremely well to treatment and within three months marked improvement occurred in all the 13 children who underwent adequate treatment.

A scheme for the medical examination of school children was inaugurated in all railway schools, with one exception. The system of recording and maintaining data presented no difficulties and the maintenance of further records of the periodical examinations made through school life should prove of great value.

Experiments to determine an efficient and economical means of treating water with gaseous chlorine continued to receive attention. The scheme for the improvement of the Donakonda water supply was completed.

The application of the Hours of Employment Regulations and the Payment of Wages Act worked smoothly throughout the year. The introduction of the Hazardous Occupation (Lead) Rules is another advance in industrial hygiene. These rules provide for better conditions of personal hygiene and ventilation amongst employees handling lead, etc., and principally affect employees of brass foundries, white metalling shops and the printing press and lead burners in the train lighting shops. The application of these rules presented no difficulties.

Training classes in first-aid were continued and 433 persons took the courses. Of these 141 were awarded certificates, five vouchers, eight medals and four labels.

South Indian Railway.

A total of 36,269 persons was treated in hospitals and dispensaries during the year under review, these including 15,680 cases of infectious disease. Influenza cases numbered 6,050 dengue 52, cholera 19 (with six deaths) and smallpox 57 (with four deaths). Practically all these cases of cholera occurred outside railway premises. Plague was absent, but as one case occurred in Coonoor outside railway premises and as this disease was notified as occurring in the Nilgiris district, Hosur, etc., preventive inoculations were carried out among certain groups of employees. The number of days of certified sickness from all causes totalled 234,372, including 28,146 on account of influenza and 254 on account of dengue.

Special steps were taken to combat malaria in the *ghat* section of the railway. In addition to the usual prophylactic and curative measures, a sub-assistant surgeon trained in anti-malaria work was temporarily appointed for this work and the results obtained were promising. The question of water-supplies continued to receive constant attention.

A start was made during the year with an organised health and welfare scheme, a centre being opened temporarily at the Golden Rock Hospital. Both attendances and results were encouraging. The medical examination of school children was continued and the district medical officer at Golden Rock reported that parents were co-operating more actively in this work. First-aid certificates granted numbered 138.

Great Indian Peninsula Railway.

For a total staff of 79,707, the number of days of certified sickness amounted to 673,932. A total of 197,538 cases was treated in hospitals and dispensaries, amongst whom important causes of sickness were malaria 5,522 cases, other fevers 19,932 (including 11,368 for influenza), venereal diseases 1,021 cases (including 448 for gonorrhoea, 64 soft sore and 509 syphilitic infections), tuberculosis of the lungs 145 cases (with 18 deaths) and enteric fever 48 cases. As regards epidemic diseases, 61 cholera cases with 21 deaths were recorded, four and one from plague and 200 and eight from smallpox. Anti-cholera and anti-plague inoculations performed numbered 11,384 and 2,308 respectively, whilst vaccinations against smallpox totalled 9,666. Anti-rabic treatment continued to be available at Byculla, Igatpuri, Bhusaval, Jhansi and Sholapur centres, a total of 340 cases being treated. The usual anti-malarial measures were practised widely and by control of mosquito breeding considerable improvement in the malaria situation was obtained.

Birth and death rates remained the same as last year, *viz.*, 9.0 and 5.0 *per mille* respectively, whilst the infant mortality rate decreased from 231 per 1,000 live-births during 1936 to 185 during the year under review. The Bhusaval infant welfare and maternity centre continued to do useful work and two other centres were expected to be opened shortly.

Forty-six classes in first-aid were held, 538 candidates receiving instruction. Of these, 254 passed and obtained first-aid certificates, seven obtained vouchers, five medallions and three labels.

East Indian Railway.

During 1937-38, the number of sick days further decreased from 863,988 in 1936-37 to 756,973. This figure was about 21 per cent. less than that recorded in 1935-36. No outbreak of epidemic disease occurred during the year under review, this being mainly attributed to the efficient practice of vaccination and re-vaccination against smallpox and to the increasing use of mass inoculation with anti-cholera vaccine. The anti-malaria campaign was continued with satisfactory results. Anti-rabic treatment was given to 1,049 persons.

Eastern Bengal Railway.

From a total staff of 53,579, hospital and dispensary cases numbered 199,623, this figure including 12,182 malaria cases, 7,392 diseases of the eye, 7,532 influenza, 4,177 dysentery, 22 cholera, 83 smallpox, 110 tuberculosis of the lungs, 189 epidemic dropsy, six cerebrospinal meningitis, 84 enteric fever, 126 kala-azar, 31 leprosy, 73 gonococcal infection and 69 syphilis cases. The number of days of certified sickness further increased from 259,657 in 1935-36 and 277,567 in 1936-37 to 356,274, the increase being partly due to an increased incidence of malaria, which disease alone accounted for 60,001 days of certified sickness.

Although cholera and smallpox were prevalent in epidemic form in Calcutta and its suburbs during February and March, the incidence of these diseases in the railway colonies was not high. Stations which were under malaria control may be divided into those (a) where anti-larval work was carried out for a radius of half-a-mile beyond the railway boundaries; (b) where anti-larval work was confined to railway limits, the areas outside being dealt with by various other authorities such as those of tea-gardens, municipalities, military authorities, district boards; (c) where anti-larval work was carried out in special

areas ; and (d) where anti-parasitic measures only were carried out. Malaria-controlled stations continued to maintain steady improvement in the reduction of malaria incidence with a consequent saving of sick-man-days. Although an increase of malaria was recorded in several areas, it cannot be said that the disease was anywhere prevalent in epidemic form.

One hundred and sixty-two persons were given anti-rabic treatment ; no case of hydrophobia after treatment was reported.

Courses of instructions were arranged in first-aid for 306 persons, of whom 213 obtained first-aid certificates. A total of 4,569 employees are now in possession of first-aid certificates, 31 home-nursing, 154 vouchers, 42 medallions and 20 labels.

Bengal and North-Western Railway.

Reports from the different hospitals and dispensaries showed a steady increase of work and two new appointments were made to the nursing staff. The chief diseases dealt with included malaria, dysentery and tuberculosis ; there was no serious epidemic. Pyrocide 20 was used as an anti-malarial measure and this helped considerably to free the houses from mosquitoes. A considerable number of analyses of water-supplies was carried out.

Assam Bengal Railway.

From a staff numbering 33,195, days of certified sickness totalled 92,109. Cases treated in railway dispensaries numbered 96,089, including 23,489 malaria cases.

An undue incidence of enteric fever occurred in Chittagong, the majority of these cases having been admitted to the Railway Hospital at Chittagong from Pahartali. Efforts were made to have all employees and their families living in Pahartali colony inoculated with anti-typhoid vaccine and a total of 9,678 inoculations was carried out, after which no further cases were recorded. Cholera accounted for 17 cases and four deaths, smallpox for 20 cases and six deaths and enteric fever for 83 cases and eight deaths. Other diseases treated included two cases of leprosy, 208 mumps, 111 chickenpox, 98 measles, seven diphtheria and 62 kala-azar. Influenza cases at Gauhati numbered 405. Preventive inoculations against cholera and vaccinations against smallpox numbered 2,187 and 5,586 respectively, whilst 556 doses of combined cholera and dysentery bacteriophage were issued to staff and passengers suffering from suspected cholera or dysentery. Anti-rabic treatment was given to 99 cases.

Courses of lectures in first-aid were continued and examinations held from time to time as required. Of 130 candidates appearing for the examination, 95 passed.

The Staff Benefit Fund was used to provide a midwife at four of the most important stations. These midwives attended 139 confinements and also assisted in the nursing and treatment of women and children in their homes and at the hospitals.

SECTION V.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH INCLUDING PORTS.

Introduction.

49. The three important international organisations with which India is closely connected in the sphere of public health and port quarantine are the Office International d'Hygiene Publique, Paris, the Health Organisations of the League of Nations, Geneva, and the League's Eastern Bureau at Singapore.

The Office International d'Hygiene Publique which was created by an International Agreement signed at Rome on 9th December 1907, has framed six Conventions. These are :—

- (1) The International Sanitary Convention, signed at Paris on 21st June 1926 ;
- (2) The International Sanitary Convention for Aerial Navigation, signed at the Hague on 12th April 1933 ;
- (3) The International Arrangement, signed at Brussels on 1st December 1924, relating to facilities given to sailors for the treatment of venereal diseases ;
- (4) The International Convention for mutual protection against dengue fever, signed at Athens, on 25th July 1934 ;
- (5) The International Arrangement, signed at Paris on 22nd December 1934, regarding the abolition of bills of health and the suppression of consular visas ;
- (6) The International Arrangement concerning the transport of corpses, signed at Berlin, on 10th February 1937.

India although an adherent to the agreement of 1907, and signatory to the I.S.C., 1926, has so far adhered only to the fifth of these conventions and the ratification of the sanitary conventions for health control of shipping and air traffic is much to be desired.

The Health Organisation of the League which consists of (a) a General Advisory Health Council, (b) a standing Health Committee and (c) a Health Section of the Secretariat of the League, was created in accordance with article 23 (f) of the Covenant of the League of Nations and the resolution adopted by the Assembly on 8th December 1920, regarding the establishment and working of the technical organisations of the League. The Public Health Commissioner with the Government of India is a member of the standing Health Committee and is also a member of the Advisory Council of the Singapore Bureau.

The experience gained at the various meetings arranged by these organisations and the contacts with delegates of other countries, many of whom are faced with problems similar to those in India, have been of the greatest value, e.g., in the elaboration of measures for prevention of the spread of yellow fever from Africa by air. As regards the League also, India has been instrumental in influencing its policy. For instance, the Rural Hygiene Conference held in the Far East during 1937 was the result of a suggestion made by the Indian delegation to the Assembly of the League in September 1932.

Abbreviations.—I. S. C.—International Sanitary Convention.

P. H. O.—Port Health Office.

As usual, the Office of the Public Health Commissioner with the Government of India continued to function as the Epidemiological Bureau of the Government of India. Epidemiological information was issued in a series of weekly and monthly statements and bulletins.

Office International d'Hygiene Publique, Paris.

50. (A) The May session was attended by Lt.-Col. E. Cotter, I.M.S., as delegate for India. The business was transacted as usual through Commissions. The delegate for India was nominated to four of these, *viz.*, quarantine, aerial navigation, yellow fever and cholera.

The Quarantine Commission considered, *inter alia*, the question of deratisation of ships before the lapse of six months, with reference to communications received from the Department of National Health of the Argentine Republic and the Public Health Service of the U. S. A. The Commission held that on the one hand, the "periodical" deratisation of ships must not be imposed more often than every six months (or seven months, if the supplementary return period to the 'home' port is granted), an exception being naturally made in cases, in which an exceptionally large number of rats on a crowded ship of defective construction or badly kept, threatens serious harm to the port or to other ships. On the other hand, the Commission referred to cases in which a ship having been exempted from deratisation during a considerable stay in port for repairs might thus be exposed to re-infestation by rats coming from other ships or from the dock. It was considered best that, circumstances permitting, inspections or deratisations under article 28 of I.S.C., 1926, should be carried out as near to the time of departure as possible.

A discussion centred round the statement made by the Commission in a previous report, which had been questioned by certain authorities, that no valid certificate of periodical deratisation under article 28 of the I. S. C., 1926 should be given after a "partial deratisation". The Commission insisted that the periodical certificate for six months should only be issued when the sanitary authority was satisfied that the ship was actually free from rats.

The Aerial Navigation Commission considered a note communicated by the delegate for India on the measures taken at the Airport of Karachi to prevent the introduction of yellow fever into India by air. It was agreed by the Commission that a person coming from a yellow fever area should not be allowed to embark on an international going aeroplane even if he were only going from one aerodrome to another in the same country. In this connection the Commission remarked as follows :—

"It may happen, although comparatively rarely, that a passenger may wish to use an aeroplane of an international line to travel from one aerodrome to another in the same country. According to general principles of law, the measures prescribed by the International Sanitary Convention for Aerial Navigation do not concern such a passenger, he is subject only to internal regulations.

If, however, he comes from a region where yellow fever exists, might it not be desirable to require that he should only embark in an aeroplane making an international flight if the precautions laid down in Article 42 have, if necessary, been applied to him ?

The danger which may arise from carrying such a person is, in the opinion of the majority of the members of the commission, doubtless very small—almost hypothetical. On the other hand, the provisions of the Convention are intended to cover all cases in which measures are justified for the common defence against yellow fever infection, and it would seem logical to apply them without distinction, by requiring that any person whatsoever coming from a region where such infection exists, shall only board an aeroplane in international service under the conditions laid down by international rules. The Commission, confronted with yellow fever problems not yet fully elucidated, feel disposed to answer the question provisionally in the affirmative, in order to avoid anything likely to give rise to apprehension."

This Commission also considered (i) the question that aerodromes used only as fuelling grounds should or should not be forced to comply with all the provisions of article 38 of I. S. C. for Aerial Navigation, (ii) information received regarding the use of toxic gases in the destruction of mosquitoes in aircraft, (iii) the question of the establishment of a uniform international tariff, (iv) the application of the I. S. C. for Aerial Navigation to military and naval aircraft, (v) the interpretation of article 9 of the convention, and (vi) the possibility of transmission of dengue fever by aircraft during an epidemic.

The Cholera Commission examined the results of the researches carried out in India by Colonel Taylor*, Director, Central Research Institute, Kasauli, and his colleagues and by Dr. A. D. Gardner of the Standards Laboratory of the Medical Research Council, Oxford and Mr. Bruce White of the National Institute for Medical Research, Hampstead.

Other subjects discussed at this session included plague, smallpox, typhus, yellow fever, tuberculosis, nutrition, malaria, public dental services, leishmaniasis, training of midwives, Weil's disease, hygiene centres, rheumatism, mental hygiene, cerebrospinal meningitis, encephalitis, poliomyelitis, tularaemia, scarlatina, etc.

The communications from India submitted during the session included (i) The immunity of the wild rat in India to plague by Sokhey and Chitre, (ii) A note on typhus like infections in India by Shortt, (iii) A note on the "Work on Nutrition in India" by Dr. Aykroyd.

(B) At the October meeting, Major General Sir John Megaw attended as delegate for India. He was appointed a member of the quarantine, pilgrimage, air navigation and yellow fever commissions.

The Quarantine Commission discussed a few difficult points in connection with the periodic deratisation of ships, i.e., the application of article 28 of the I. S. C. 1926. Of these the most important was that "*unless plague infected rats were in question there was no reason for imposing deratisation before the expiry of the regulation period*". In this connection the Commission remarked as follows:—

"The Commission certainly recognised that there were exceptional cases in which the infestation of the ship was obviously such that immediate measures were called for in its own interest. Even at the present session, cases of this kind had been brought to the notice of the Commission, particularly by port authorities in the Argentine, the United States of America and Great Britain. In other cases to which its attention had been called the necessity for deratisation had not seemed so obvious. The Commission wished to point out that from the international point of view, which was the one on which Sanitary Conventions were based, measures should only be taken in cases of real danger. Such danger existed in the case of an unusual rat mortality (although, as appeared from a recent example reported by the British Delegate, such mortality need not be due to plague) but it existed only very exceptionally in the case of an 'undue prevalence' of rats".

The Quarantine Commission for Aerial Navigation had a number of interesting points to consider.

(1) Must passengers coming from a region in which yellow fever exists, and using, within the boundaries of one country, an aircraft of an international line, be subjected to the measures laid down in the 1933 Convention? The Commission was of opinion that the measures against yellow fever laid down in the Convention should be applied equally to all passengers using an international line. The Commission also expressed the view that, in order to adhere to the spirit of the Convention, the regulations of each country should provide for the application of these measures.

* (a) Note on "Some recent work on cholera in India" by Taylor, (b) A study of the vibrio group and its relationship to cholera by Taylor, Pandit and Read, (c) A note on the bacteriological findings in clinical cholera in Calcutta in relation to epidemiology by Read.

(2) There are aerodromes which are only intended as stopping places of short duration during the day-time, in order that aircraft may be refuelled. If such a stopping place were situated in a region where there is a possibility of risk of infection of the aircraft or passengers by yellow fever virus, the aerodrome should, in order to comply with the terms of article 38 of the 1933 Convention, be an "Anti-amaryl" aerodrome. In the case of a simple "refuelling aerodrome" could it be considered, under the terms of this article, that the requisite conditions are fulfilled :—

- (i) if the aerodrome is situated at an adequate distance from the nearest inhabited area and is kept free from mosquitoes by the application of systematic measures mentioned in the Convention ;
- (ii) if passengers only embark when provided with a medical certificate certifying that they have not been in contact with a known case of yellow fever during the previous six days ?

Two different aspects of this question arise and the following decisions were reached :—

" (a) An aerodrome situated and equipped as described might serve as a refuelling aerodrome, *provided that it was not intended to serve any other purpose*. It seemed obvious that the condition relating to "mosquito-proof dwellings for the crew and passengers" would thus be pointless, since the aircraft was only remaining a very short time on the landing-ground and was not embarking or disembarking anyone. This opinion of the Commission was, however, only adopted under a reservation formulated by the Delegate for India.

(b) No passenger might embark at such an aerodrome. It did not seem necessary to make any special arrangements for a case of this kind in view of the fact that it could only occur very rarely. Moreover, it would be difficult for the medical officer of the aerodrome to estimate the danger presented by a passenger desiring to embark or else he would have to exact from him guarantees which it would be practically impossible to obtain "

Other subjects discussed by this Commission included (a) whether properly equipped and mosquito proofed hospitals in the neighbourhood might serve instead of the special dwellings for passengers in anti-amaryl aerodromes mentioned in article 38 (d) of the I. S. C. for Aerial Navigation ; (b) the addition of a protocol to the convention against dengue fever ; (c) as regards "regions infected or suspected" of yellow fever in Africa, the Commission held the view that a region could only be officially considered infected or suspected if yellow fever had been discovered and notified there ; further that an entire country should not be considered infected or suspected when only one or more regions had been notified as infected with yellow fever.

The President of the Yellow Fever Commission as usual presented at the plenary session a summary of information on yellow fever covering the nine months period ending September 1937. In British West Africa, 61 cases and 52 deaths were reported from 23 places in the Gold Coast and 16 cases with nine deaths from nine places in Nigeria. A noteworthy feature of one of the outbreaks was that it occurred at a time when the stegomyia index was very low. The experience of this outbreak showed that a locality is not free from risk until the larval index has been reduced to zero.

The portion of the report relating to vaccination against yellow fever is reproduced below :—

" *Vaccination*.—Dr. Findlay reports that nearly 600 persons have been inoculated up to the present with attenuated tissue culture virus injected without the addition of immune serum. In no case has the immediate reaction been severe. One advantage of the use of attenuated tissue culture virus is that this virus cannot be cultivated (or can be cultivated only quite exceptionally and with the greatest difficulty) in *Aedes aegypti* and therefore cannot be transmitted when these insects happen to bite a person recently vaccinated with it. The vaccine could therefore be used without risk in tropical countries where stegomyia mosquitoes are prevalent.

Jaundice as a late sequela of vaccination.—Among 2,200 persons who at various times during the last few years have been immunized against yellow fever by vaccination, 51 cases of jaundice occurring between two and six months after the inoculation, have been detected. Five of the cases occurred in England, the rest in Africa. Dr. Findlay has kindly furnished the following account of this complication :

" The symptoms are as follows. The patient feels off colour with a sense of heaviness over the liver : the appetite is poor and often there is a feeling of nausea and occasionally vomiting. During this period the temperature may be raised to 99 degrees or 100 degrees F., though more frequently the patient remains afebrile. After three or four days a deep jaundice develops and the conjunctiva and skin become yellow. Bile is present in the urine and occasionally a small trace of albumen. The stools in cases of any severity are clay coloured. The Van den Bergh reaction is biphasic, the liver slightly enlarged and the blood shows a leucopenia with a relative lymphocytosis. The jaundice may persist for some weeks. These symptoms have occurred very irregularly during the past five years and have followed the use of neurotropic yellow fever virus and tissue culture virus with or without the addition of human, horse and monkey immune yellow fever sera.

The following theories have been suggested to explain the occurrence of these cases of jaundice :—

- (1) The symptoms may be due to a recrudescence or reactivation of the yellow fever virus. The symptoms, however, are not those of yellow fever, but resemble those of epidemic catarrhal jaundice. Attempts to obtain virus from the blood of persons with post-inoculation jaundice have failed and there is no rise in yellow fever immune body titre during or after the attack of jaundice.
- (2) The symptoms of jaundice may be entirely unrelated to the yellow fever inoculation and may be due to infection with the virus of epidemic catarrhal jaundice. Two of the 51 persons known to have had jaundice after inoculation were exposed to infection from epidemic catarrhal jaundice and developed jaundice in the correct incubation period of catarrhal jaundice, but although epidemic catarrhal jaundice is by no means rare, 2·3 per cent. of 2,200 people could hardly become infected naturally.
- (3) Some hepatotoxic substance is introduced with the inoculum. No obvious toxic substance is introduced, the total amount of foreign protein is very small.
- (4) The virus of epidemic catarrhal jaundice might have been introduced into the inoculum. The only possibility here seems to have been that the normal human serum used for suspending the virus might possibly have contained a virus, although such serum is derived from presumably healthy persons and is filtered through a Seitz filter. In order to eliminate entirely such a possibility, all serum used in suspending the virus or for tissue culture work is exposed to a temperature of 56° C. for 30 minutes before use.
- (5) The jaundice is part of an anaphylactic syndrome. It is known from the work of Hughes (1933) that a protein derived from the breakdown of tissues occurs in the blood during the acute stage of yellow fever, and this protein is antigenic in the person from whom it is derived. It is conceivable that an anaphylactic reaction might occur between the immune body to this protein and fresh tissue breakdown products. "
- (6) The yellow fever virus reduces the resistance, so that any subsequent non-specific attack on the liver may cause sufficient damage to produce symptoms of jaundice. In this connection the possibility that the resistance to epidemic catarrhal jaundice is reduced cannot be overlooked. One case of post-inoculation jaundice appeared to be precipitated by an operation for hernia in which the anaesthetic consisted of alcohol, chloroform and ether.

Efforts are now being made to determine which of these possibilities represents the true explanation with a view to overcoming this difficulty in the successful use of yellow fever virus."

Other subjects discussed during the meeting were typhus, smallpox post-vaccinal encephalitis, plague, mental hygiene, tularaemia, scarlet fever, malaria therapy, bacillary dysentery, rabies and poliomyelitis.

Singapore Bureau, League of Nations Health Organisation.

51. The Advisory Council held its tenth meeting at Bandeong on the 2nd and 11th August, 1937 during the Rural Hygiene Conference. The Council recommended, (i) that consideration be given to the desirability of ensuring that all passengers leaving smallpox infected ports should be required to produce evidence of immunity against the disease ; and (ii) that strict attention be given to the enforcement of Article 28 of the I. S. C., 1926.

The Health Committee of the League at its 26th Session held at Geneva on November 4th took note of the resolutions of the Advisory Council and decided to transmit them to the Permanent Committee of the Office International d'Hygiene Publique. The Health Committee also considered that it would be of great mutual benefit if the health administrations of eastern countries could attach one of their officials to the Singapore Bureau for periods of 12—18 months. The Health Committee, after consultation with the Reporting Committee of the Malaria Commission, shared the opinion of the Rural Hygiene Conference on the advisability of organising annually at Singapore, if possible, a Round Table Conference on Malaria in which members of the Malaria Commission resident in the East might usefully take part. It approved the suggestion that the agenda of the first Conference should include the following items :—

- (i) Mesological (naturalistic) methods of malaria control ;
- (ii) The co-operation of the participants in health surveys—in so far as they concern malaria—which may be undertaken in their respective countries ;
- (iii) Their views on the possibility of organising a campaign in certain experimental areas as a controlled demonstration ;
- (iv) The co-operation of the participants in providing the Secretariat of the Commission with such material as may be called for by the inter-governmental Conference on anti-malaria drugs.

Epidemiological Intelligence.—The Eastern Bureau continued to receive from Eastern Governments epidemiological notifications required under the I. S. C., 1926, and to forward these immediately to Paris *via* Geneva and to health authorities of countries in the Eastern Area.

The weekly wireless message continued to be transmitted from Saigon on short wave. Since the change from long to short wave, transmission difficulties in reception have been notified from Australia and South Africa. Arrangements to change the time of transmission and the wavelength in the case of Australia were contemplated as the conditions of reception there favoured such a change. The difficulty in regard to South Africa is that the Tananarive Station uses only short wave transmission and the Near Eastern centres including Alexandria, Khartoum, Berbera and Aden are unable to receive the message. It has been suggested to the Director, Health Section, League of Nations, Geneva, that radio-nations might possibly be able to transmit to the Near Eastern centres the contents of the Eastern Bureau's weekly message at a time and on a wavelength that can be satisfactorily received. British India failed to receive the message on two occasions.

The Malabar Wireless Station (Java) continued to pick up the Saigon message and to repeat it every Saturday. In addition, the Malabar station transmitted daily a summary of the Saigon message mainly for the benefit of the shipping services, any additional information received between the weekly messages from Saigon is also included in this daily transmission.

Weekly cables were continued in the case of Vladivostock, Bushire, Baghdad, Victoria (Seychelles), Aden and Berbera. By an arrangement with the President of the Sanitary, Maritime and Quarantine Board of Egypt, the Eastern Bureau now cables to Alexandria each week the disease situation in the seaports and airports of India, Ceylon and Burma.

The authorities at Khartoum who had asked for the weekly cable to be sent to them directly from the Eastern Bureau are being supplied with this information from Alexandria Bureau each Friday afternoon.

The weekly Fasciculus which is supplied to 45 countries now includes information in regard to a number of airports on the direct routes from Indo-China, Netherlands India, Australia and Malaya to Europe.

Quarantine restrictions.—The Ceylon Quarantine Regulations No. 49 (5) provides that—

"(5) No person shall embark on any vessel arriving at any port which is infected with smallpox, unless he is first vaccinated or declared by the Port Health Officer to be already sufficiently protected against smallpox, and unless all his clothing, bedding and other articles likely to harbour infection are subjected to such processes of disinfection as the Port Health Officer may in his discretion specify."

The Straits Settlement Quarantine Ordinance provides in the case of smallpox that, if the Port Health Officer or Health Officer so directs, no immigrant or pilgrim from an infected or suspected local area shall be permitted to enter or land in the Colony unless the Port Health Officer or Health Officer is satisfied that he has been protected by recent vaccination against the disease in respect of which such local area was declared to be infected or suspected at the time of his embarkation. The Ordinance gives the Health Officer or Port Health Officer power to direct that *any* person who arrives from an infected or suspected local area may be included under the definition of 'immigrant'.

Aerial Navigation.—Information concerning the incidence of disease in airports is now being received from countries situated on regular flying routes from the East to Europe and incorporated in the weekly wireless message and Fasciculus. The arrangement by which the Air Port Health Officer, Karachi, notifies the Bureau of the arrival of passengers from suspected yellow fever areas was found to work satisfactorily in the case of a private aeroplane which had travelled across Central Africa and thence *via* Khartoum and Karachi to Eastern countries. The Bureau transmits such information immediately to all airports on the route followed.

The question of what constitutes the best method of freeing an aeroplane from mosquitoes has been receiving attention in several countries.

Disease incidence in ports.—Two of the six plague infected ports were in British India, *viz.*, Cochin four cases and Karachi 17 cases. As regards cholera, Calcutta, with 1,846 cases, was again one of the most heavily infected ports in the East; Canton had 6,000 cases, Shanghai 3,408, Bangkok 1,851, Hongkong 1,690, Macao 651, Madras 787, Haiphong 642, Ningpo 234, Bassein (Burma) 225, Swatow 216, Nanking 188, and Chittagong 174; elsewhere the incidence was slight or sporadic. Bombay was the most heavily smallpox infected port having recorded 1,162 cases; Madras reported 755 cases, Calcutta 588, Shanghai 584, Chittagong 449, Mergui (Burma) 409, Moulmein (Burma) 165, Hongkong 123. Elsewhere the disease was only sporadic.

Pilgrim traffic.—The permanent Committee of the Quarantine Board of Egypt declared the pilgrimage clean, no case of plague or cholera having occurred at the Hedjaz. The health of the pilgrims arriving at El Tor was satisfactory.

Liaison Work.—The Eastern Bureau continued to act as a distribution centre for documents received from the League of Nations Health Organisation, Geneva.

Malaria Course.—The fourth international course in malariology was held during April to May, 1937, and was attended by 16 medical officers, two of whom were from India. Major H. W. Mulligan, I.M.S., officiating Director, Malaria Survey of India, Kasauli, was deputed by the Government of India to serve as Lecturer on epidemiology.

League of Nations Health Organisation, Geneva.

52. The Health Organisation continued to devote particular attention to the problems of housing, nutrition and physical education. A programme of work was drawn up covering the multiple problems raised by the hygiene of building, housing and national equipment for this work. This programme has been put into execution and the Housing Committee was able to draw up a report on the hygiene of environmental conditions (heating, cooling, ventilation, humidity) and noise abatement. This report indicates the state of existing knowledge and includes a table of the systems and methods now in use.

In order to carry out the studies included in the programme, seven countries have set up national committees.

The Commission of physiologists made a further study of certain obscure problems relating to nutritional science and the technique of inquiries into dietary habits and the state of nutrition of a population. A list of these questions has been communicated to the learned societies and national committees of eleven different countries which are at present conducting relative investigations. The mixed Committee on the problem of nutrition incorporated its findings in a report entitled "The relation of nutrition to health, agriculture and economic policy". The bulk of this report is devoted to the economic and agricultural aspects of the problem which were only touched on briefly in the interim report.

In the matter of physical fitness, the Health Organisation organised in May, 1937, a meeting of highly qualified experts from a number of countries to discuss the orientation of work on this question. Two specialists in questions of physical development visited the principal physical education institutes of Europe to examine their methods and to study the present movement which tends to make athletics an essential part of the general education of the future citizen.

An Intergovernmental Conference of Far Eastern countries on Rural Hygiene was held in Java under the auspices of the League. This Conference is dealt with in a separate paragraph (see page 129). The second Committee of the Assembly requested the council of the League to transmit the report of this Conference (A. 19.1937) to the Governments concerned inviting them to apply the recommendations contained therein and to request the competent organs of the League to engage themselves in the technical activities which the conference proposed to entrust to the League.

In connection with the International Exhibition at Paris, the Health Committee organised a European Exhibition of Rural Housing.

The fourth general report of the Malaria Commission "The therapeutics of Malaria" was issued.

The group of experts appointed by the Health Organisation completed their study of maternal welfare in various European countries.

The service of epidemiological intelligence continued to work successfully.

Thirty-nine countries have so far adopted the international standards established by the Biological Standardisation Commission of the League. An Agreement was reached between the Belgian Government and the Council, whereby the Health Organisation lends its technical assistance to the permanent International Secretariat for the unification of Pharmacopoeias in Brussels.

The most important item on the agenda for the 25th Session of the Health Committee, held in May and attended by Lt.-Col. E. Cotter, I.M.S., the substitute delegate for India, was the detailed three-year programme. The more important items on the programme were—

(i) *Biological Standardisation*.—In discussion it was agreed that with the increasing adoption of international standards, which will increase the work of the central institutes at Copenhagen and Hampstead, national institutes should as far as practicable take up themselves the manufacture of these international standards. A detail which concerned India was the standardisation of anti-snake venom sera. It was proposed to limit the study of viper anti-sera to the European viper. Regarding the standardisation of vitamins, a third international conference was planned for the beginning of 1938, a conference was also projected on hormone standards.

Malaria.—The programme included an intergovernmental quinine conference. It was proposed to continue the international malaria courses in Rome and at Singapore for the next three years.

Nutrition.—Reference was made to the second report of the mixed Committee on nutrition and the recommendations made therein for the formation of national committees.

Physical fitness.—It was proposed to appoint a committee of physiologists to formulate scientific bases for rational physical education adapted to different ages.

The 26th session of the Health Committee was held from 1st to 4th November and was attended by Major-General Sir John Megaw as the substitute delegate for India. This session emphasised the remarkable success of the intergovernmental conference of Far Eastern countries on Rural Hygiene. It passed resolutions requesting the Director of the Health Section to arrange for the execution of the conference's recommendations, more especially those concerning general health surveys, fly control, malaria, plague, tuberculosis and pneumonia; to call for the observations of the Permanent Committee of the Office International d'Hygiene Publique on the conference's recommendations on the subject of plague; to collect material for the assistance of such Governments as may undertake public health surveys recommended by the conference; and to consider suitable measures for bringing about the necessary international co-ordination. The Health Committee further requested the Director to consider the best means of putting into effect the conference's recommendation that a study of rural reconstruction centres should be made by a special group of persons closely engaged in such work and to consider the best method of ensuring the co-ordination for which the Eastern Bureau is responsible in the framing and execution of anti-tuberculosis programmes. Other subjects considered by the Health Committee included (i) the fourth general report of the Malaria Commission entitled "The treatment of malaria" and the programme of the Malaria Commission. A sub-committee was constituted for the preparation of a draft report on the standardisation of the nomenclature employed in malariology. The organisation of a collective study tour in certain countries of the Mediterranean basin was approved. The Director of

the Health Section was requested to consult the interested Governments regarding the desirability of holding an intergovernmental conference on anti-malaria drugs. The Health Committee, having consulted the reporting committee of the Malaria Commission, shared the opinion of the Rural Hygiene Conference on the advisability of organising annually at Singapore, if possible, a round table conference on malaria in which members of the Malaria Commission resident in the East might usefully take part. It drew attention to the importance of including in the plans of the general health surveys suggested by the Rural Hygiene conference the study of morbidity due to malaria, the influence of malaria on general mortality and the economic and social effects of malaria on the population.

As regards biological standardisation it was decided that two conferences of experts for revision and development be held during 1938, one on the results already reached in the field of vitamins and hormones and the second of serologist members of the Permanent Commission on Biological Standardisation.

In referring to the technical commission on nutrition the decisions of the Assembly (1937) regarding the Health Organisation's studies on nutrition, the Health Committee drew particular attention to that regarding the extension of these studies to the populations of Asia and all tropical countries in general. In approving the report of the Housing Commission and its programme of activities for 1938 and 1939, the Health Committee attached particular importance to the setting up of national housing committees in as many countries as possible. It also recommended the constitution of national committees on physical fitness. It was further decided to appoint a technical commission of pharmacopoeial experts for the preparation of a programme of studies, including the selection of suitable drugs for examination and the determination of a uniform method of analysis, assay and preparation of the drugs selected.

Intergovernmental conference of Far Eastern countries on Rural Hygiene.

53. At the 13th session of the Assembly of the League of Nations (1932), the representative of India, supported by the representative of China, expressed the hope that as soon as funds permitted the Health Organisation of the League would hold a Rural Hygiene Conference for the Far East on the lines of that held for Europe in 1931. The Health Committee of the League referred the proposal to the Advisory Council of the Eastern Bureau at Singapore which in 1933 declared itself in favour of holding such a conference. The proposal was repeated and accepted by the Assembly at its 15th ordinary session (1934).

The Health Committee having proposed that the Conference should be held in 1937 at Bandoeng at the invitation of the Netherlands Government, the Council of the League approved in October, 1935, this recommendation and, in January, 1936, sanctioned the constitution and despatch to the Far East of a Preparatory Committee of three members which, from April to August, 1936, visited India, Burma, Siam, Malaya, Indo-China, the Philippines, the Netherlands East Indies and Ceylon.

This preparatory Committee described the fundamental terms to which the problem of rural medicine and health could be reduced under the conditions presenting themselves in the Far East.

The Conference was held at Bandoeng from the 3rd to 13th August, 1937, and was attended by 66 delegates from India, Burma, China, French Indo-China, Japan, Malaya, Netherlands India, Siam, the Philippines, Hongkong, Ceylon, British North Borneo, Fiji and the Western Pacific; 29 others attended as experts or observers. The delegates included medical men concerned with

curative and preventive medical services, educationists, agronomists, specialists in rural reconstruction, sanitary engineers, experts in nutrition and research workers devoting their attention to specific diseases.

The delegation from India comprised the following members :—

Government of India.

- (1) Sir Mirza Muhammad Ismail, K.C.I.E., O.B.E., Dewan of Mysore State, Leader of the British Indian Delegation ;
- (2) Lt.-Col. E. Cotter, I.M.S., Deputy Public Health Commissioner with the Government of India ;
- (3) Major H. W. Mulligan, I.M.S., acting Director, Malaria Survey of India, Kasauli ;
- (4) Dr. W. R. Aykroyd, Director of Nutritional Research Laboratory, Coonoor.

Provincial Governments.

- (5) Dr. P. F. Russell, International Health Division of the Rockefeller Foundation, King Institute of Preventive Medicine, Guindy (Government of Madras) ;
- (6) Lt.-Col. A. C. Chatterjee, I.M.S., Director of Public Health, Bengal (Government of Bengal) ;
- (7) Dr. D. N. Roy, Assistant Professor of Entomology, School of Tropical Medicine, Calcutta (Government of Bengal) ;
- (8) Lt.-Col. C. M. Nicol, I.M.S., Director of Public Health, Punjab (Government of Punjab) ;
- (9) Dr. Mojibur Rahman, D.P.H., Officiating Personal Assistant to the Director of Public Health, Bihar, and Officer in charge of Public Health Bureau, Bihar (Government of Bihar).

Indian States.

- (10) Dr. C. F. Chenoy, Deputy Director of Public Health, Hyderabad (Nizam's Government) ;
- (11) Dr. Spencer Hatch (Travancore Government) ;
- (12) Dr. P. Parthasarathi, Director of Health, Mysore (Government of Mysore State) ;
- (13) Mr. R. V. Desai, Registrar, Co-operative Societies, Baroda State ;
- (14) Mr. C. V. Sane, Deputy Director of Agriculture, Baroda State.

Indian Research Fund Association.

- (15) Dr. R. Row, M.D.

Business was mainly transacted through five committees, constituted for discussion of the principal subjects.

(i) The first committee dealt with health and medical services, Lt.-Col. Cotter, Lt.-Col. Nicol and Dr. Rahman being members. Three sub-committees were appointed to deal with medical education, budgets and the international survey of Eastern Countries concerning methods and costs. One of the most important subjects discussed was the collection of vital statistics.

(ii) The second committee, presided over by Sir Mirza Ismail, discussed the subject of rural reconstruction and collaboration of the population. Lt.-Col. Chatterjee, Dr. Spencer Hatch and Mr. R. V. Desai were members. Great emphasis was laid by this committee on the development of health organisations for villages or groups of villages.

(iii) The third committee on sanitation and sanitary engineering included as members Lt.-Col. Nicol, Dr. Chenoy, Dr. Parthasarathi and Dr. D. N. Roy. A sub-committee was appointed to discuss the subject of flies. Problems dealing with housing, water-supply, disposal of refuse and other wastes and fly control were discussed and specific recommendations made.

(iv) Dr. W. R. Aykroyd, Mr. C. V. Sane and Dr. Spencer Hatch were members of the fourth committee which dealt with nutrition. A technical group was also appointed.

(v) The fifth committee dealt with measures for combating certain diseases in rural areas, particularly those constituting a social scourge. The British Indian members on this committee were (a) *malaria* :—Major Mulligan, Dr. Russell and Dr. Parthasarathi ; (b) *plague* :—Dr. Row, Dr. C. F. Chenoy and Dr. M. Rahman ; (c) *leprosy* :—Dr. Row, Col. Chatterjee and Dr. Spencer Hatch ; (d) *tuberculosis and pneumonia* :—Colonel Nicol and Dr. Rahman ; (e) *ankylostomiasis* :—Dr. Parthasarathi and Dr. Chenoy.

This Committee appointed a technical sub-committee and five technical groups. Dr. Russell presided over the technical committee on malaria and Dr. Row on the technical group for leprosy.

At the opening of the Conference Sir Mirza Ismail addressed the meeting in the following words :—

“ MR. PRESIDENT AND GENTLEMEN.

We are met to discharge a great responsibility. It is no light task to advise one-half of the human race as to the measures necessary to ensure them a fuller, a happier and a healthier life. For that is what I take it our agenda involves, including as it does, for all the countries represented here today, rural improvement, nutrition, sanitation, the organisation of health and medical services, and measures for combating specific diseases. I am sure we are all conscious of the onerous task before us, and I may perhaps be permitted to say for myself that it is with diffidence that I have undertaken the responsibilities involved in leading the delegation from India, though I am reassured in so doing by the records and attainments of the delegates accompanying me.

THE GOVERNMENT OF THE NETHERLANDS INDIES.

2. Before, however, I proceed to touch on the matter of our agenda, there is one task I feel it less difficult to discharge, namely, to render thanks on behalf of the Indian delegation to the authorities of the Government of the Netherlands Indies for the generous welcome that they have accorded to us for the admirable arrangements that have been made for our discussions and for our health exhibition, and for the attractive proposals that they have put forward for visits to places of administrative, historical or other interest. It has been a matter of surprise to me that there should have been so little collaboration between this country and India in dealing with problems which are common to both. And I welcome most warmly the opportunity that has been given me of learning something of the scientific and administrative methods followed in this country.

HEALTH ORGANISATION OF THE LEAGUE OF NATIONS.

3. I am sure that I shall be voicing the feelings of you all if I ask you to pay a tribute of thanks also to the Health Organisation of the League of Nations, which is doing so much for the promotion of peace by arming us with weapons against the common enemies of mankind, and by helping the nations to learn to understand one another through co-operation for beneficent purposes.

PREPARATORY COMMISSION.

4. We must also express our gratitude to the Preparatory Commission, the members of which I am delighted to see here. Most of us have had the pleasure of welcoming them in our respective countries in the course of their very rapid tour through the vast area concerned, and we have read their report, which deals so ably and exhaustively with the subjects before us, and which will, I am sure, form a most useful basis for our discussions.

CONFERENCE AGENDA.

5. To return again to the subject of our agenda, which, as I have suggested, involves nothing less than the health and welfare of one-half of the human race. The Latin poets loved to sing of the delights of life in the country, and the tradition persisted in Europe till very recent years of the rosy-cheeked peasant, whose healthy occupation and communion with Nature kept him free from the diseases that troubled the town-dweller. The Great War and the enquiries that have followed it have exploded this idea, even in Europe. In the East I doubt if it ever attained any similar popularity. Certainly not in India where it was said of the Indian ryot fifty years ago—

He eats and has indigestion,
He works and may not stop.
His life is a long-drawn question,
Between a crop and a crop.

NATIONAL REPORTS.

6. The National Reports prepared by the different countries for this Conference stress the difficulties and disabilities of the peasant's existence. Our task is to discover the causes of this state of affairs, to find the means of counteracting those causes, and to raise his standard of production, his standard of living, his standard of hygiene and his standard of happiness.

INDIAN PEASANT.

7. It is, of course, a fact that the peasant in Hindustan has, at any rate, until quite recent years, paid a much higher share of the cost of the administration than any other class. This was due partly to the traditional system of land revenue, partly to the fatal facility with which cesses for different purposes were added to it, partly to the fact that the growth of the trading community has only been gradual. But this is only one cause among many for the low economic condition of the Indian peasant. The great checks on the growth of the population, such as famine and widespread epidemics, have to a great extent been done away with, and, as a result, you have a pressure upon the land and its produce that presents an apparently insoluble problem. It is rendered no easier of solution by the fact that an army of fourteen million beggars, many, if not most, of them able-bodied, contribute nothing to their own sustenance. Nor is this problem of population pressure confined to the human race. Custom decrees that cattle shall not be killed, that young bulls shall not be castrated and that all the cattle shall graze together on a common grazing ground. As a consequence you have a formidable total of 210 million cattle for the country to sustain or 60 to every 100 human beings. Many of these cattle yield nothing in the shape of milk or work.

8. It has been calculated that the soil of India, if properly handled with scientific rotation of crops, is capable of supporting a larger population than at present, and yet the peasant secures the poorest of livings from it. The causes of course are numerous; fragmentation of holdings by an immemorial custom of inheritance, exhaustion of the soil through failure to return the waste, ignorance of the cultivator, lack of capital, lack of energy, inability to co-operate and the listlessness that comes through underfeeding, malaria, hookworm and other diseases.

NUTRITION.

9. One of the most important subjects with which the Conference has to deal is that of nutrition. Our aim is not only to prevent disease but to improve the health and vitality of the people. Improvement in diet will further both ends. Malnutrition is widespread throughout India and there can be no doubt that a great deal of ill-health, low vitality and disease is due to insufficient and improper food.

10. Now it is perfectly true that in India poverty is the first and foremost cause of malnutrition. From Cape Comorin to Kashmir our country is terribly poor. Further, we are burdened by climatic conditions which often make the production of food a grim struggle against adverse circumstances.

11. But in spite of poverty I think that a great deal can be done to improve the diet of the people if a vigorous and considered plan of action is followed. Even under existing conditions India might produce more of the foodstuffs she needs most. The people are very ignorant about diet and this often applies to the well-to-do as well as the poor. Nevertheless, there is a great and growing interest on the subject throughout the country.

12. I feel that the problem needs to be attacked from many angles. First, we need research workers and organisations to supply the necessary scientific knowledge. Next, it is necessary that this knowledge should be given practical effect. Here agricultural, health and educational departments can give effective help. Agricultural departments must improve crops and introduce new methods and ideas which will lead to better nutrition. Public health authorities must learn to regard nutrition work as an essential part of their activities, and help in the instruction of the people. Educational departments must teach children more about food and its effect on their bodies. It will be for the Conference to consider in detail the lines to follow in improving nutrition. I am sure that any recommendations which may be made will receive close attention in India both from the authorities and the public.

13. Particular attention should, I feel, be given to what is sometimes called the "rice problem". In milling, rice is deprived of some of its valuable elements. At present mechanical rice mills seem to be spreading everywhere; I would ask you to consider whether the erection of rice mills on the present plan should not be checked, or whether some process of rice milling without the loss of all the most nutritious elements cannot be popularised.

HIS EXCELLENCY THE VICEROY.

14. We, in India, are fortunate in having a Viceroy who has made a special study of agriculture, animal husbandry, nutrition and public health. His keen personal interest in the welfare of the rural population, his unwearied efforts in promoting it, and his deep knowledge of their problems are well-known and highly appreciated in the country.

CENTRAL ADVISORY BOARD OF HEALTH.

15. At this point I may suitably mention the recent creation of a Central Advisory Board of Health for all India, which is attended by public health authorities from the various Provinces and States. It will be among the tasks of the Central Health Board to guide public health policy throughout the country. We may confidently hope that much good will result from the activities of such a representative body.

MALARIA.

16. Of the formidable list of diseases with which India is afflicted, malaria is certainly the one which exerts the most adverse influence on the health and prosperity of her people. Although less dramatic in its immediate effects than the great epidemic diseases, such as, plague, cholera and smallpox, malaria is a relentless scourge which is responsible for incalculable suffering and economic loss. It has been estimated that some 100,000,000 people in India suffer yearly from malaria and that, of these, at least 1,000,000, die from its direct effects. The debility, poverty and apathy caused by this disease are factors of the first magnitude in retarding the national, social and economic progress of the country.

17. India abounds in natural conditions which favour the occurrence of malaria. Unfortunately, these are frequently supplemented by conditions created through the activities of man. The ravages of famine have been removed by the provision of improved communications and great irrigation schemes, but only too often these measures—primarily designed for the welfare of the rural population—have been associated with a great increase in the incidence of malaria. It seems illogical to direct our energies against the natural causes of malaria while we ourselves are responsible for the creation of fresh sources of danger almost daily. Is it not possible to take advantage of the enormous benefits of modern engineering without leaving a train of sickness behind? This is a question which, I hope, will receive the attention of this Conference.

18. The present century has seen great progress in the development of methods for the eradication or control of malaria but those are, unfortunately, very costly and are practicable only in restricted circumstances. It is my earnest hope that this Conference will give due consideration to the possibilities of providing effective anti-malaria measures which will be within the very limited resources of the peoples of rural areas in the tropics. It seems to the layman that much might be accomplished by improved methods of agriculture and more carefully applied irrigation.

SIGNS OF PROGRESS.

19. While I draw this depressing picture I must not fail to give credit to the immense advance that has already been made in dealing with these problems. Enormous sums have been spent on irrigation works which have resulted in increased productivity of the soil and have helped to secure the country against famine. Remarkable discoveries of agricultural experts and extensive instruction of the ryot have helped in the same direction. And the great improvement of communications has put anything like the loss of life that followed the famines of fifty years ago out of the question.

20. Meanwhile, scientific discoveries on the part of medical men have relieved us of the blind fear of half a century ago regarding plague, cholera and other diseases that were apt to sweep off whole populations. We have learnt much from Europe in the matter, for instance, of co-operation. We have learnt much from one another, for instance, in the matter of turning waste to wealth by composting. There are other tasks of a similar kind which still confront us. In my opinion, second to none in importance is the provision of a safe and adequate water-supply for every village. Of almost similar urgency is the making of provision, by means of a suitable type of latrine, not only for preventing human waste from forming breeding centres for diseases, but also for returning it to the land in order to restore its productivity. There is no lack of technical knowledge in respect of these matters. Much, however, remains to be done by those central and local bodies who are responsible for the health and welfare of the people, particularly in the matter of drinking water wells.

THE FUTURE.

21. But I think we may say that the future is full of hope. I think that, in a great part of India at any rate, we may expect that quicker progress will be made by reason of the fact that thirty-six million villagers have recently been given the vote. They have thus become the objects of much solicitude and attention on the part of those from whom the future governments of the country will be recruited, and such political parties as may develop may be expected increasingly to vie with one another in securing the favour of the peasant by furnishing him with better amenities of life.

22. There is, however, a baffling enigma that still remains. I refer to the difficulty of creating in the peasant a spirit of self-reliance. Years of heartbreaking experience on the part of many devoted workers have shown how almost impossible it is to rouse him from his pathetic contentment with things as they are. Numerous instances show how under energetic leadership he can be induced, so long as the leadership lasts, to mend his ways in most, if not all, of the respects to which I have referred, but much depressing experience shows that as soon as the leadership is withdrawn the experiment is apt to collapse.

23. My own belief is that our main, if not our only, hope lies in working through the rising generation. It is sometimes said that what we have to do is to "rouse the sanitary conscience of the people". A conscience in my experience consists largely of an instinctive reaction to precepts learnt in childhood, and if you have learnt no sanitary precepts in childhood, you can have no sanitary conscience. Our aim, therefore, should be to implant in the rising generation the seeds of health by care during infancy and the seeds of a sanitary conscience by instruction in healthy habits at play centres, schools and colleges. We should teach them the use of pumps and sanitary latrines by installing them at schools and colleges and insisting on their proper employment. We should teach a knowledge of proper foods by insisting on their use at all government hostels or other institutions which we can control. And I think we may hope in this way to promote the coming of a generation that will have so learnt how to appreciate the comforts of sanitary living, that they will refuse to relapse into the old apathy when they come to set up homes for themselves.

24. In speaking on this vast subject of rural hygiene, it is impossible not to refer, however briefly, to the difficult problem that confronts India, as it does, I think, many other countries of Asia. I refer to the low economic condition of our peoples. It is difficult for countries, circumstanced as they are, to grapple successfully with disease. So long as such a low economic standard persists and devitalises the people, progress in combating social and health evils cannot be either rapid or enduring. No government can afford to neglect such a problem, and the sooner some solution is found for it the greater the reward they will reap in the happiness and contentment of their people.

25. Before concluding, let me emphasise the necessity for co-operation between the administrator and the scientist in this formidable task of improving rural life. The administrator has the responsibility of ameliorating the wretched economic conditions which are the fundamental cause of much ill-health and disease. It is he who holds the purse strings and he should recognise that the wise spending of money on improving the health of the people is really an investment of public funds which can in time show an incalculable return.

26. Gentlemen, I have endeavoured to sketch to you the broad outline of the task that lies before us. I have not ventured to touch upon the details of the processes for making a new heaven and a new earth for the Eastern peasant. These details the scientists among us will prepare. That is a task for the various expert committees to undertake. I think we may look forward with confidence to the production of a code of advice that will be of inestimable benefit to our different countries."

The resolutions adopted at the conference covered, as might be expected, a very wide field. For these and for further details, reference should be made to the Report of the Conference (League of Nations) Official No. A.-19-1937-III, dated 8th September 1937.

Sir Mirza Ismail, the leader of the Indian delegation, recommended that a second Rural Hygiene Conference for Eastern Countries be held five years hence in the belief that, if such conferences were convened periodically, the progress achieved in various countries could be examined and further suggestions for advance could be made in the light of experience gained in the interval.

An International Rural Health Exhibition was organised by the Government of the Netherlands Indies during the Conference, this contained exhibits from British India, Burma, Ceylon, China, French Indo-China, Japan, Malaya, Siam and the Netherlands East Indies.

Indian delegation to the 18th Ordinary Session of the Assembly of the League of Nations held from the 13th September—6th October, 1937.

54. The Indian Delegation consisted of His Highness the Right Honourable the Aga Khan, G.C.S.I., G.C.I.E., G.C.V.O., leader of the Delegation; Sir Denys Bray, K.C.S.I., K.C.I.E., C.B.E.; and Dewan Bahadur Pandit Dharam Narain (Chief Minister, Udaipur State). Sir Govind Balwant Pradhan acted as substitute delegate.

During the general discussion on health questions Pandit Dharam Narain spoke as follows :—

"The Conference on Rural Hygiene in the Far East, for which, he reminded the Committee, the Indian delegation had pressed strongly at previous Assemblies, had concluded its labours. It went almost without saying that the work of the Conference was of the greatest interest to India, —a country whose population was mainly rural and agricultural. India had been represented at the Conference by a strong delegation which included representatives of the Central Government, the Provincial Governments and the Indian States. It was too early yet to consider in detail the results achieved by the Conference, but he hoped that when the Assembly met next year the recommendations of the Conference would have been in the hands of Governments long enough for them to be fully and freely discussed.

Meanwhile, the Governments in India had not been idle in developing rural hygiene in the areas under their administration. Health units for rural health demonstration work had been established in the United Provinces and in the Delhi area. Grants-in-aid for rural reconstruction had been given by the Government of India to Provincial Governments for expenditure over a period of years, in addition to grants for the development of the co-operative movement.

Last year the delegate for India had informed the Committee that active steps were being taken to establish a Central Advisory Board of Health for the entire country. He was now able to announce that this Board had been set up. Its main function was to act as a central information bureau on all public health matters affecting India and as a clearing-house for such information.

With regard to the standardisation of drugs, he was also able to announce an advance. A bio-chemical standardisation laboratory, consisting of a bio-assay sub-section and a pharmaceutical sub-section, had been established at the All-India Institute of Hygiene and Public Health at Calcutta for the control and standardisation of drugs. The Government of India also contemplated the introduction of legislation for controlling the manufacture and sale of drugs.

For many years eminent doctors working under the Government of India had been engaged in research into malaria. The results achieved were too well known to need recapitulation. Special attention was at present being paid to the utility of quinine in the treatment of the disease, and with a view to its increased production and distribution the Government of India intended to investigate the possibilities of extending cinchona cultivation in India. A special grant of 10 lakhs of rupees had been made to the Indian Research Fund Association to aid in the control and eradication of malaria in some of the worst affected areas.

Training in anti-malarial measures was provided in India by means of annual classes lasting for about six weeks, and the Government of India was actively co-operating in the international courses in malariology held every year at Singapore.

Useful anti-tuberculosis work was being done in India by the King George Thanksgiving Fund which allotted annual grants to local voluntary and other societies and associations undertaking anti-tuberculosis activities.

On the question of housing, the Government of India had recently collected from the Provincial Governments a considerable amount of information in both its urban and rural aspects. This material showed that many municipalities were dealing with the problems of urban housing while the local Governments were interesting themselves in rural housing.

It was but natural that housing conditions in India should vary from province to province, if only because of the variations in climate. The essential requirements—well-ventilated houses with good sanitary surroundings—were everywhere the same; but the methods employed to meet these needs, the types of buildings required and the general planning of towns and villages, were different in different parts of the country.

The studies on housing which the Health Organisation had undertaken up to now seemed to have been concerned exclusively with conditions in European countries and countries with a European civilisation. But in the East the problem was very different from that in the West. For this reason it was very gratifying that the question of housing had figured on the agenda of the Conference of Far Eastern Countries on Rural Hygiene. The Government of India would study with special interest the part of the report of the Conference dealing with this subject.

In conclusion, he wished to say that the activities of the Health Organisation had been useful in furthering the cause of improvement in health conditions and he hoped they would continue to bear good results.

During the discussions on nutrition, especially with reference to the final report of the Mixed Committee, entitled, "The relation of nutrition to Health, Agriculture and Economic Policy", published in August, 1937, Pandit Dharam Narain, after expressing his appreciation of the Mixed Committee's Report, said that—

"the progress of nutrition work in India had received a valuable stimulus from the expert interest shown in that question by the Viceroy. Both the Central and Provincial Governments were alive to the nature and extent of the problems confronting them in this field, and were inaugurating policies for the improvement of the nutritional state of the population.

Progress was being made by Dr. Aykroyd, Director of the Nutrition Research Laboratory at Coonoor, in the collection of data relating to deficiency diseases, vitamin standards and the analysis of foodstuffs. Last year the delegate of India had informed the Committee that Dr. Aykroyd was preparing preliminary tables of the nutritive values of a large number of common Indian foodstuffs. Those tables had now been published by the Government of India and widely circulated throughout the country.

The Nutrition Advisory Committee of the Indian Research Fund Association was carrying on its valuable work ; while anthropometric data bearing on nutrition had also been collected. It was now possible to publish some of the results of these researches in a form suitable for education and propaganda, and this was being done. Closer co-ordination in nutrition work was being established with the Agricultural and Veterinary Departments, which should be productive of good results. In particular, close co-operation was being established with the Agricultural Department in the matter of increased production and sale of milk and its by-products.

The Government of India were co-operating in the enquiries into the problem of nutrition in the East undertaken by the League Health Organisation.

In the report on the Physiological Bases of Nutrition published by the League the dietary standards were based upon investigations conducted in Europe and North America. Due account must, however, be taken of the great differences between conditions in East and West, and it should be emphasised that it was impracticable to adopt those standards as a basis for nutrition work in Eastern countries. He was nevertheless convinced that all countries—Eastern and Western—would greatly benefit from the valuable work accomplished by the League in this field.

The resolution adopted by the Committee included an invitation to the Council to arrange for annual meetings of representatives of National Nutrition Committees, and a request that Governments should submit to the League annual reports on their nutrition work".

The fifth Committee dealt with a number of social questions including traffic in women and children and child-welfare.

The Committee also discussed a proposal for the establishment in the East of a League of Nations Bureau to collect information on the traffic in women and children in Eastern countries and to co-ordinate the measures taken by the authorities. This proposal had been put forward at the Conference of Central Authorities in Eastern Countries, held at Bandoeng in February, and had been unanimously approved by the Social Questions Committee. In the Fifth Committee the scheme was supported by a number of delegates and opposed by none. Pandit Dharam Narain said that the Government of India assumed that the proposed Bureau would deal with traffic between different countries only and that the reports to be furnished by the participating countries would relate only to that traffic and not to traffic wholly confined to one country. On that assumption the Government of India welcomed the proposal, although their practical interest was limited by the admittedly small volume of traffic to and from India. It might be well to mention that it would lie almost wholly with the Provincial Governments to give effect to the proposal by supplying the periodical reports and by acting on the suggestions of the Bureau. In conclusion, he declared that the Government of India would only participate in the work of the Bureau subject to the understanding that they would not be asked to make any special grant towards its maintenance in addition to their general contribution towards the expenses of the League.

A Sub-Committee, which included Pandit Dharam Narain, was appointed to study how best the proposal could be carried into effect. At its first meeting, this Sub-Committee was informed that the Secretary-General saw grave objection to a Bureau such as was suggested coming under the administrative control of the Secretariat of the League. In deference to this opinion the Sub-Committee came to the conclusion that it could not proceed with the precise scheme recommended by the Conference.

So much support, however, had been given to the proposal, both at the Bandoeng Conference and subsequently, that the Sub-Committee felt that every effort should be made to put the scheme into effect in some other manner. They, therefore, recommended that the Governments of eastern countries represented at the Conference should be invited to form an International Bureau to undertake the functions contemplated by the Conference and that the League Secretariat should take the initiative in laying the proposal before these Governments and of facilitating in every way within the power of the League the creation of such a Bureau. The resolution finally adopted by the Fifth Committee, however, confined itself to asking the Council to appoint an expert adviser to discuss the matter as soon as possible on the spot with the interested Governments.

The Committee also discussed the past and future activities of the Advisory Committee. Special emphasis was laid upon the desirability of studying the best methods of training social welfare workers and upon the importance of improving the collaboration between the Advisory Committee and other organs of the League.

In the course of the discussion, Pandit Dharam Narain said that—

“India was fortunately very little concerned with the international traffic in women but was nevertheless a party to the White Slave Traffic Conventions of 1910 and 1921. As recognised by the Commission of Enquiry, which had visited the East some years ago, the policy of the Government of India in regard to internal traffic was abolitionist. There were no licensed houses and no registered prostitutes, nor was there any compulsory medical supervision of prostitutes.

In these circumstances, it was not altogether surprising that the Government of India had shown some reluctance in agreeing to be represented at the Conference of Central Authorities in Eastern Countries, especially as the main concern of the Conference was international traffic. When, however, they realised the importance attached to India's participation, they had agreed to be represented by a full delegate in the person of Mrs. Mukherjee, Chairwoman of the All-India Women's Conference. The Conference had appointed Mrs. Mukherjee its Vice-President.

The attitude of the Government of India towards the most important resolution adopted by the Conference, that recommending the establishment of an Eastern Bureau, had already been defined. The Government saw no great objection to the other resolutions with several of which it was not concerned. Existing arrangements in India regarding the matters dealt with were adequate and it might not be necessary to take any further special measures in this respect.

India took a progressive interest in the welfare of her young people. A Department of Maternity and Child Welfare had recently been set up at the All-India Institute of Hygiene and Public Health. Indian women realised the importance of the subject and the vote given to millions of women under the new Constitution would act as an added stimulus.

The welfare of a country, and indeed of the human race, depended on the welfare of children. The diet, health, recreation, education, environment, general upbringing, etc., of children were all of the utmost importance. Shortcomings here were generally due to ignorance, which in most cases had economic causes.

The pooling of information, ideas and experiences no doubt served a very useful purpose in furthering the cause of child welfare, but some of the problems covered by the phrase “Social Questions” were of a purely domestic nature. Their solution could best be left to the Governments concerned. These alone had the necessary knowledge of national and local social conditions and customs, which often had their roots in the religion of the people. He did not think that attempts to solve such problems internationally could be anything but premature. They could only end by doing violence to popular sentiment and making the tasks of Governments more difficult.”

During the discussion of the subject of opium and other dangerous drugs, a number of delegates drew attention to the importance of the Convention of 1936 for the Suppression of the Illicit Traffic in Dangerous Drugs, and earnestly hoped that it would soon receive sufficient ratifications to bring it into force. It was noted with appreciation that the Government of India had taken the lead in ratifying the Convention.

Pandit Dharam Narain, after congratulating the Rapporteur, said that—

"the results of the opium policy of the Government of India could best be illustrated by a few figures. In 1905 the area under poppy cultivation in India had been about 760,000 acres; in 1935 this area had dropped to 35,978 acres. This meant that for every hundred acres under cultivation at the earlier date there were less than five acres now. In 1895 the *per capita* consumption of opium in India had been 27 grains per year: in 1935 it was no more than 10.80 grains."

"There could be little doubt, however, that the rapid decrease in consumption during recent years was partly due to economic causes. The passing of the depression might be accompanied by some increase in this figure."

"In India, opium was used much less for smoking than for eating. Opium smoking was severely condemned by public opinion. It had therefore been possible to prohibit the sale of prepared opium throughout the country."

"On the other hand, the practice of eating raw opium had existed in India for a very long time, but its use was moderate and was decreasing by degrees. For instance, raw opium was used on social and ceremonial occasions, and also extensively as a house-hold remedy. Interference by Government with the object of putting a stop to these traditional habits might lead to an increase both in the illicit opium traffic and in the use of more dangerous drugs and other stimulants. Such a policy would merely create new and more serious problems. In this connection it might be mentioned that the raw opium distributed in India had a lower morphine content than foreign opium; moreover, the morphine content decreased with the time the raw opium took to reach the consumer."

"The figures for consumption which he had just given covered all uses of opium, including veterinary uses. These last must be extensive, since there was in India more than one head of cattle and horses to every two of the human population."

"In these circumstances, the Government of India was not prepared to declare opium, eating unlawful, nor to go beyond the traditional policy of tolerating a moderate use of raw opium, while taking every possible measure to prevent abuse. Such a policy left no margin of surplus available for the illicit traffic. This was borne out by the fact that during recent years there had been hardly any seizures of Indian opium in the illicit international traffic. Yet India had ratified the Convention of 1936 for the Suppression of the Illicit Traffic in Dangerous Drugs."

"In India strict control was maintained throughout the area in which the opium poppy was cultivated. There was efficient supervision over the production, manufacture and distribution of opium. The Government of India had an intimate knowledge of the circumstances and the legitimate requirements of the various localities, and was thus in a position to solve all problems connected with these matters. In such circumstances it was not surprising that the Government of India had questioned the utility of the proposed conference on the limitation and control of the cultivation of the opium poppy and the production of raw opium. That Government, however, had now intimated its readiness to co-operate in it."

"In 1925, the Government of India had introduced a policy of progressively reducing exports of "Provisions" opium to countries in the Far East. This policy had achieved its object in December 1935, when exports entirely ceased. In this way India had sacrificed a considerable amount of revenue. The loss represented an additional burden on the Indian tax-payer. Moreover, the cultivators of the areas where opium was formerly grown had undergone no little inconvenience and hardship by losing a valuable crop which also provided oil for use in agriculture and cake for cattle."

"Yet India would consider herself amply compensated for these losses if events were to prove that she had furthered the League's efforts to prevent the abuse of opium, and other dangerous drugs. The Indian Government therefore earnestly hoped that its action would be followed by a general improvement in the situation with regard to the drug traffic throughout the world, and especially in eastern countries."

Port quarantine.

55. Provincial agency in respect of port quarantine at the major seaports of Madras, Bombay and Calcutta terminated on 1st April 1937; at the ports of Karachi, Cochin, Vizagapatam and Chittagong, it lapsed after the close of the year under report, *i.e.*, on 31st March 1938. All functions under Sections 6 (1) (p), 17, 49 and 50 of the Indian Ports Act, 1908, at the major ports are now exercised by the Central Government. Functions under these sections at minor ports continue to be carried out by the Provincial Governments.

Of the major seaports, only those at Madras, Cochin and Vizagapatam remain unprovided with whole-time port health staffs. With the formation of a central port health cadre which is at present under consideration, the provision of suitable health personnel will be greatly simplified.

Although the I. S. C., 1926, and the I. S. C. for Aerial Navigation, 1933, have not yet been ratified, the Government of India continued to work to their provisions.

The fumigation of vessels by the hydrogen cyanide process was the subject of trial at the port of Bombay.

An Agreement has been arrived at between the Government of India and the Government of French Indo-China for the reciprocal abolition of consular visas on bills of health of vessels plying between India and French Indo-China.

In exercise of the powers conferred by clause (p) of sub-section (1) of Section 6 of the Indian Ports Act, 1908, the Central Government have issued rules regarding the fumigation of coastal vessels, etc., at the Bombay Harbour, *vide* Education, Health and Lands Department Notification No. F-9-1/37-G., dated 23rd July 1938.

Revised and up-to-date port health rules under Section 6 (1) (r) have been issued, *vide* Education, Health and Lands Department Notification No. F-9-2/36-G., dated 18th October 1938. Draft rules for the sanitary control of aircraft are still under consideration.

Facilities for the treatment of seamen, suffering from venereal diseases, continued to be provided at all major ports.

Whilst a fully equipped airport has been established at Karachi for the reception of all aircraft coming from the West, aircraft coming from the East are not subjected to sanitary measures at Dum Dum which is the landplane airport on the eastern frontier of India. Since the close of the year under report, however, it has been decided to equip the Dum Dum Aerodrome as a "sanitary aerodrome" and the necessary staff has been sanctioned.

Under the provisions of Article 100 of the I. S. C., 1926, shipping companies are required to provide for each person, *irrespective of age*, an area of 1.50 square meters, equivalent to 16 English square feet, in between decks of pilgrim ships, over and above the space reserved for the crew. Under Article 113 (1) of the Convention, the master of a pilgrim ship is required to keep a list showing the names and sex of the pilgrims who have embarked and the total number of pilgrims he is authorised to carry. The carriage of pilgrims over the authorised number is punishable with fine. The Indian Law contained in section 149 (3) of the Indian Merchant Shipping Act, 1923, which is applicable to pilgrim ships, differed from Article 100 of the Convention in that while the latter includes all persons, irrespective of age, the former expressly excludes from the definition of pilgrim a child under one year of age. The Indian Merchant Shipping Act has since been amended so as to conform to the requirements of the I. S. C., 1926.

The following minor ports in *Sind* have been declared as ports for shipment and landing of goods under Section 11 (a) of the Sea Customs Act VIII of 1878 :—(1) Ketī Bunder ; (2) Sando Bunder ; (3) Sokhi Bunder.

Trade with foreign countries can be carried on from these ports. In the past, rice in large quantities was exported from Ketī Bunder and Sando Bunder to non-Indian foreign ports by country craft, but at present there is no trade with foreign ports. No steamships can call at these ports.

In *Bombay Presidency*, these ports include Vengurla and Malwan.

In *Orissa*, Gopalpur (Ganjam) maintains regular shipping traffic with Rangoon. Puri has occasional shipping traffic with the ports of Galle and Colombo.

Madras Presidency has 28 minor ports, viz., Calingapatam, Bimlipatam, Cocanada, Masulipatam, Cuddalore, Porto Novo, Tirumalavasal, Negapatam, Topputturai, Adirampatnam, Tondi, Pamban, Kilakrai, Danushkodi, Tuticorin, Kulasekarapatnam, Ponnani, Calicut, Badagara, Tellicherry, Cannanore, Kasaragod, Mangalore, Ammapatnam, Malpe, Hangarakotta, Coondapoor and Mulki.

Information in respect of Bengal is not available.

The incidence of major epidemic diseases is shown in maps Nos. 1, 3 and 4 facing pages 30, 36 and 42. Table V (i) gives reported deaths from the more important diseases in the major port towns; Table V (ii) gives figures for rats destroyed within port areas.

In addition 1,507 and 1,958 rats were caught and killed on board ships in Bombay and Calcutta. None of these rats was found infected with plague.

At Bombay, 48 unloaded ships were deratised both by fumigation and trapping and were granted deratisation certificates, whilst 22 unloaded vessels were given exemption certificates; at Calcutta, 56 and 58 vessels and at Karachi two and eight ships were fumigated and given certificates.

Port of Bombay.

56. *Staff and administration*.—Lt.-Col. C. L. Bilderbeck, I.M.S., was the Port Health Officer; from 3rd April to 16th October Major C. K. Lakshmanan, I.M.S., officiated.

Incoming vessels.—As usual, medical inspection and disinfection only of "infected" or "suspected" vessels were carried out. These numbered 119, having on board 19,365 members of crews and 33,742 passengers and pilgrims. Excluding intercoastal vessels but including hired transports, 24 of these were found to have or to have had cases of infectious diseases on board at the time of arrival or during the voyage. Measles was the cause of 23 cases, chickenpox 28, jigger 11 and smallpox one. Bills of health were endorsed to show the diseases which had occurred on board and the measures taken to prevent the spread of infection on board or overseas.

Outgoing vessels.—A total of 761 vessels, carrying on board 58,033 members of crews and 57,006 passengers, were inspected. Fifty-six cases of infectious diseases, including four among crews were discovered and along with 66 contacts were not allowed to proceed on the forward journey. Fifty-one cases of infectious diseases were reported to have been landed in overseas ports.

The system of advance medical inspection introduced in 1935 in the case of larger passenger vessels was continued.

Of the 10,324 European members of crews of 401 cargo vessels 1,053 or 10.2 per cent. were found unvaccinated or insufficiently protected against smallpox, whilst all the European crews of 39 passenger ships were found to be vaccinated. Only four males out of a total of 278 and eight women and children out of 377 through passengers were found unvaccinated. In 197 passenger ships, excluding pilgrim and Africa-bound vessels, out of a total population of 14,567 males and 12,829 females, the number of unprotected or insufficiently

TABLE V (i).

	Bombay.		Calcutta.		Madras.		Karachi.		Chittagong.		Cochin.		Vizagapatam.	
	Deaths.	Rate per mille.	Deaths.	Rate per mille.	Deaths.	Rate per mille.	Deaths.	Rate per mille.	Deaths.	Rate per mille.	Deaths.	Rate per mille.	Deaths.	Rate per mille.
Total	30,575	26.3	6,452	28.7	25,403	40.1	6,176	24.9	1,229	23.1	616	27.0	1,858	32.4
Smallpox	687	0.6	403	..	196	..	44	0.2	117	2.2	..	..	..	..
Cholera	4	..	634	1.0	229	..	..	..	90	1.7	..	..	..	..
Plague	..	..	..	..	..	..	14	..	..	..	2	0.1	..	..
Enteric fever	341	0.3	1,126	1.0	96	0.1	35	0.1	48	0.9	51	2.2	29	0.5
Malaria	72	0.1	746	0.7	78	0.1	25	0.1	9	0.2	..	..	15	0.3
Kala-azar	..	..	155	0.1	..	..	..	..	16	0.3	..	..	..	..
Cerebrospinal fever	154	0.1	369	0.3	..	..	4	..	..	..	..	..	..	..
Influenza	65	0.1	311	0.3	..	..	..	..	1	..	..	..	1	..
Measles	211	0.2	145	0.1	8	..	45	0.2	1	..	..	..	..	..
Dysentery	539	0.5	1,470	1.3	1,224	1.9	Not available.	..	68	1.3	77	3.4	115	2.0
Tuberculosis	2,025	1.7	3,104	2.7	1,155	1.8	575	2.3	13	0.2	51	2.2	92	1.6

TABLE V (ii).

Name of Port.	Rats.			Remarks.
	Destroyed.	Examined.	Found infected with plague.	
Calcutta	9,710	1,963	..	..
Bombay	8,326	8,326	..	..
Karachi	1,992*	131	1	*Destroyed in wharf area.
Madras	117	117	..	..
Chittagong	12,003	461	90	..
Cochin	446	446	..	..
Vizagapatam	..	..	..	..

protected was 1,010 and 451 or 6·9 per cent. and 3·5 per cent. respectively. In addition, 14·7 per cent. of the men and 2·5 per cent. of the women and children embarking from Bombay on 156 ships failed to produce vaccination certificates. A detailed examination of the crews of 25 British, American or other foreign vessels showed that out of 812 crew, 39 were unvaccinated, 138 were vaccinated in childhood, 152 had been vaccinated more than 10 years ago and 225 3—10 years ago.

Red Sea pilgrim traffic.—A total of 5,336 pilgrims on 11 vessels sailed for Jeddah. As usual, every pilgrim ship was thoroughly cleansed and freed from rats before the commencement of her first voyage; on subsequent voyages exemption from further deratisation was given if after inspection she was found free from rats. All pilgrims were medically inspected and all dirty bedding and clothing likely to have been exposed to infection were disinfected before embarkation. All were vaccinated and inoculated against cholera.

Of the 11 vessels with 5,134 pilgrims which returned from Jeddah, two had on board cases of infectious diseases. Total deaths on board numbered 29, these being mostly due to dysentery and general debility.

General.—(i) *Disinfection.*—Twenty-six vessels were disinfected on account of infectious disease.

(ii) *Rats and fleas.*—The anti-rat campaign in the docks was as usual carried out by the Bombay Port Trust, the number of rats killed being 8,326, those destroyed in Bombay city numbered 703,850; none showed plague infection.

(iii) *Port sanitation.*—The sanitary state of the harbour and of the *bunders* and docks was generally good. Anti-mosquito measures were as usual the responsibility of the Bombay Port Trust. A total of 27,118 country craft were examined and 3,975 or 14·7 per cent. were found to breed mosquitoes. Larger vessels are not examined for mosquitoes as a routine.

Two cases of chicken-pox occurred on two vessels while lying in the harbour.

(iv) *Miscellaneous.*—The inspection of lascars' provisions in ships was continued; 40 samples of *ghee*, one of flour and two of coriander were condemned.

Medical advice was communicated by wireless in a case of suspected appendicitis on a ship *en route* to Colombo.

Port of Karachi.

57. *Staff and Administration.*—Dr. B. F. Khambatta continued as Port Health Officer.

Incoming vessels.—One hundred and two vessels including eight pilgrim ships and four country craft, carrying 18,770 passengers and members of crews, came in quarantine. Only one case of smallpox, a deck passenger, eight cases of chicken-pox (passengers five and crew three), and four of measles were reported. Two deaths were reported on pilgrim ships during the voyage from Jeddah to Karachi.

Outgoing Vessels.—A total of 847 vessels were granted bills of health. These had on board 63,351 passengers and members of crews. One case of smallpox, 12 of chickenpox and four of measles were detected and prevented from embarkation.

Pilgrim traffic.—Ten pilgrim ships arrived from Bombay *en route* to Jeddah and embarked 5,368 pilgrims. Only one vessel with 1,660 pilgrims on board sailed direct from Karachi. Eight ships arrived with 10,252 returning pilgrims of whom 7,467 disembarked at Karachi; the remainder continued their voyage to Bombay. A total of 27 deaths, all from non-infectious diseases, occurred during the return voyages and 46 patients were found in the ship's hospitals on arrival.

General.—(i) *Rats and fleas.*—The anti-rat campaign was continued on the wharves and jetties. The average number of rats trapped per day, out of 150 traps set, was 4.53 and the total number of rats trapped and killed was 2,085. Only one rat was found infected with plague in April.

(ii) *Anti-mosquito measures.*—This work also was carried out, on behalf of the Port Trust, by the Port Health Officer both on vessels in the harbour and in the Port Trust area. Except in the case of country craft, which were inspected daily, weekly inspections were made. *Stegomyia* was the commonest species of mosquito.

(iii) *Port sanitation.*—The sanitary condition of the harbour was satisfactory. Cholera was entirely absent. Smallpox was present in sporadic form upto May, thereafter its incidence was negligible. Sporadic cases of plague were reported in a localised area about eight miles from the harbour.

(iv) *Miscellaneous.*—Provisions and stores for the use of the Asiatic crews of 42 ships were inspected. Of the 94 samples of *ghee* examined, 14 were not found to be genuine. Two ships applied for medical advice by wireless.

One steamer bound for Kathiāwar ports, one for Colombo and six for Marmagoa were granted necrological certificates at the request of the commanders.

(v) *Marine Air Port.*—With the commencement of the Empire-flying boat service, the sea-port Health Officer was entrusted with the necessary quarantine and sanitary duties. The marine airport has been fully equipped from the port health point of view, except for a suitable quarantine anchorage for yellow fever infected or suspected air-craft. In the administrative building at the marine air port, however, an mosquito proofed isolation room has been reserved for the temporary isolation of yellow fever cases or suspects pending their removal to the yellow fever isolation hospital at Drigh Road.

Airport of Karachi.

58. *Staff and administration.*—Captain C. J. H. Brink, I. M. S. was the Port Health Officer up to October when Captain M. Jafar, I. M. S. took over charge.

Aircraft.—A total of 317 east-bound aircraft, with 1,158 members of crew and 1,366 passengers, and 283 west-bound aircraft, with 1,071 members of crew

and 1,425 passengers, landed at Karachi. Details are given in Table V (iii) below :—

TABLE V (iii).

	No. of aircraft.		Members of crew.		Passengers.	
	East bound.	West bound.	East bound.	West bound.	East bound.	West bound.
Imperial Airways Ltd.	101	96	395	374	515	481
K. L. M.	115	114	496	488	711	777
Air France	54	53	166	163	108	148
Private	47	20	101	46	32	19
Total	317	283	1,158	1,071	1,366	1,425

Six passengers arrived from yellow fever areas and were kept under surveillance. Planes coming direct from Central Africa were fumigated. Of the three airlines, the K. L. M. and the French Airline do not touch infected or suspected yellow fever areas in Africa. The Imperial Airways arranged during the year that their aircraft should fly between Alexandria and Karachi in order to avoid necessity of fumigation at Karachi, but a few of their machines, which came direct from areas south of Khartoum, were fumigated at Khartoum and at Alexandria and again on arrival at Karachi.

The necessity for constant vigilance is illustrated by the fact that although the K. L. M. planes do not operate in suspected or infected yellow fever areas, in February a passenger from Central Africa transferred to a K. L. M. plane at Alexandria and arrived at Karachi within nine days of leaving an area south of Khartoum. The plane was fumigated and the passenger kept under surveillance. The K. L. M. representative in Calcutta later undertook to provide the Health Officer at Karachi with lists of east-bound passengers.

During the year 63 east-bound K. L. M., 16 Imperial Airways and two private planes were fumigated.

The airport and the surrounding villages were regularly searched for the breeding of mosquitoes and steps were taken to gain greater control over mosquito breeding in areas lying around. By co-operation between the Cantonment and Royal Air Force authorities and the Port Health Officer, mosquito breeding has been reduced to negligible proportions.

Except for sporadic cases of smallpox and plague in Karachi city, no epidemic disease occurred in the airport or in the neighbourhood, nor were any passengers found to be suffering from infectious disease.

Experiments have shown that mosquitoes can live a fairly long period after a journey of 7,000 miles, that they can bite after a long journey and that altitude and cold do not impair their vitality to any great extent. Experiments were also conducted to determine the lethal action of "pyroicide 20", flit and shell-tox or mosquitoes.

A dispensary for the treatment of minor cases was opened within the airport. Cases of serious nature were sent to the civil hospital, Karachi.

Port of Calcutta.

59. *Staff and administration.*—Major C. K. Lakshmanan, I. M. S., was the Port Health Officer; Captain M. Jafar, I. M. S. officiated for seven months.

Incoming vessels.— The total number of vessels entering the port totalled 1,249. A total of 1,397 members of crew and 2,017 passengers of 15 “suspected” or “infected” vessels were inspected. Three cases of chickenpox were found on two vessels from Rangoon. One death from enteric fever and two deaths from “other causes” were recorded among 440 European seamen admitted to hospital. Of the total, 41 admissions were due to influenza, 21 to dysentery, 16 to fever, nine to sunstroke, five to diarrhoea, three to enteric fever, two to smallpox, one to malaria and 342 to “other causes”. No alien leper entered the country through this port.

Outgoing vessels.— Of the 1,250 ships which left, “1,134 bound for ports in British India, were inspected, these carrying 93,576 members of crews and 81,128 passengers. Thirty-one members of crews and 52 passengers were prevented from sailing for various causes. Two cases of smallpox, two of measles and one of chickenpox were removed to hospital from four seagoing ships lying in the port. A total of 7,458 passengers and 176 members of crew was vaccinated.

Pilgrim traffic.— Three ships carrying 1,653 pilgrims on board left the port.

General.— (i) *Disinfection and fumigation.*— Owing to the freedom of the city and port from plague, routine disinfection of clothing and bedding of Asiatic and African members of crews and deck passengers of departing ships was not found necessary, but 12 seagoing vessels, 21 inland steamers, flats and launches and 24 lighters and dinghis, etc., were disinfected for cases of other infectious diseases which occurred in those vessels.

(ii) *Rats and fleas.*— Of the 9,710 rats killed by cyanogas and other means, 1,963 were examined, none was found infected.

(iii) *Port sanitation.*— Sanitation of the port, including anti-rat and anti-mosquito measures on shore, continued to be in charge of the Port Commissioners.

Miscellaneous.— The Port Health Department continued to inspect lascars’ provisions on ships. Of the 76 samples of *ghee* and six of lime juice analysed 20 and five respectively were found to be below standard. On seven vessels, condensed milk manufactured by firms other than those approved by the Government of India was found and on nine vessels articles of food were found of unwholesome quality. Municipal filtered water was supplied to all ships. Forty-nine cases of venereal diseases among European seamen were admitted to hospital.

Port of Madras.

60. *Staff and administration.*— An Assistant Director of Public Health of the Madras Public Health Department continued to act as part-time Port Health Officer.

Incoming vessels.— These numbered 684 and carried on board 61,290 members of crews and 59,809 passengers. Three cases of chickenpox and one case of measles were landed from ships. These were admitted to the infectious diseases hospital.

Outgoing vessels.— A total of 684 such vessels with 61,038 members of crews and 100,822 passengers were inspected and granted bills of health.

Rats.— There was no mortality among rats on any vessel.

Port of Chittagong.

61. *Staff and administration.*—Dr. T. Mukerji, B.Sc., M.B., D.P.H. was the Port Health Officer.

Incoming vessels.—Two hundred and three vessels with 73,716 passengers and 16,041 members of crews were inspected. Of these 80 were foreign and 123 coastal. Except for two cases of chickenpox on two vessels, which were removed to hospital, no cases of infectious disease occurred. One of these cases was found amongst the crew nine days after arrival and the other on the date of departure. Owing to an outbreak of smallpox in epidemic form in the town and district of Chittagong from December 1936 to June 1937, the inspection and vaccination of the crew and passengers of incoming vessels were made compulsory by a notification issued under the Epidemic Diseases Act. Of the 2,108 European seamen who arrived at this port 16 were treated in the hospital. Of these two were cases of dysentery; one case of endocarditis proved fatal.

Of the 22 Asiatic seamen treated in the hospital, two suffered from chickenpox, two from influenza, five from malaria, one from broncho-pneumonia, one from tuberculosis and 11 from other diseases.

Outgoing vessels.—These numbered 149, foreign 66 and coastal 83, and had on board 25,409 passengers and 9,622 members of crews. Vaccination of the crews and passengers on such vessels was made compulsory on account of a smallpox epidemic in the town and district of Chittagong.

General.—(i) *Disinfection and fumigation.*—Five ships, one heave-up boat and one barge were partially disinfected and fumigated.

(ii) *Port sanitation.*—Although there was an epidemic of smallpox in Chittagong town, the port area remained entirely free. Except for four cases of cholera reported on vessels lying in the harbour and a few chickenpox cases, the general sanitation of the port was good.

Filtered water was supplied to shipping from the Chittagong municipal water works.

(iii) *Miscellaneous.*—Vaccinations totalled 37,191, and 37 members of crews were inoculated against cholera. Lascars' provisions in 13 ships and medical stores and surgical appliances of four ships were inspected.

Three bags of dry fish were found unfit for human consumption.

No alien lepers entered the country through this port.

Port of Cochin.

62. *Staff and administration.*—Dr. A. U. Verghese acted as the part-time Port Health Officer.

Passenger traffic.—A total of 721 vessels with 1,046 passengers arrived, whilst 719 ships with 1,099 passengers left this port. No cases of epidemic or infectious diseases were reported.

Rats.—No mortality among rats was found on any vessel.

Port of Vizagapatam.

63. *Staff and administration.*—Dr. S. Dakshinamurti, M.B.B.S., B.S.Sc., D.P.H., D.T.M. & H. (Lond.) was the Port Health Officer.

Incoming vessels.—Fifty-two passenger ships, with 17,080 passengers and 5,934 members of crews, called at the port. Only one case of chickenpox was landed and treated at the Municipal Isolation Hospital.

Outgoing vessels.— These numbered 54 and carried on board 17,680 passengers and 6,002 members of crews. Of the 220 outgoing cargo vessels with 26 passengers and 14,232 members of crews, 77 sailed for foreign ports. These were granted bills of health after examination of the crews, and the remaining cargo ships were given the port health certificates.

A total of 1,424 members of crews on 77 foreign going ships were revaccinated.

Rats.— No mortality from rats was reported from any vessel.

Disinfection.— The steam disinfection station was maintained in good working order.

Miscellaneous.— The provisions and drugs for lascars' crews were examined and found satisfactory.

Kamaron Quarantine Station, Red Sea.

64. The pilgrimage of 1936-37 opened with the arrival of the S. S. "Teucer" from the Straits Settlements on the 17th October 1936, and closed with the departure of the S. S. "Akbar" on the 14th February 1937. Thirty-one ships including 13 from British India, seven from Straits Settlements, seven from Arabia and Africa and four from the Netherlands East Indies, carrying 24,002 pilgrims, passed through Kamaron and were dealt with according to the measures prescribed for "healthy" ships in Article XX of the Anglo-Dutch Agreement of 1926. Of the total, 13,060 pilgrims were from British India.

The health of the pilgrims was very good. Of the 21 deaths which occurred, five were on ships from British India. A European member of the crew of the S. S. "Akbar" suffering from typhoid was landed on 17th January 1937. Two cases of chickenpox and one of German measles were reported on the S. S. "Protesilans" from the Straits on 18th December 1936. All steamers calling at Kamaron were granted exemption from landing pilgrims, so that for the second time in the history of Kamaron Quarantine Station no pilgrims were disembarked for disinfection. A number of non-protected pilgrims were found on a ship from Aden, but inoculation and vaccination were carried out at Kamaron. In another case of an Aden ship carrying pilgrims and passengers, the latter were not found protected in accordance with article 128 (1) of the I. S. C., 1926, read with article 6 of the General Instructions for Pilgrims to the Hedjaz issued by the Government of India. Prophylactic treatment was provided. —

SECTION VI.

VACCINATION AGAINST SMALLPOX.

65. In view of the opposition to vaccination which is being actively fostered by unbelievers in Jenner's discovery among those in this country who are too ignorant to judge for themselves, it seems more than worth while to include in this section of the report any fresh evidence which lends support to the proven value of this preventive measure against smallpox. The report of the Director of Public Health of Madras Presidency again includes a table which gives the numbers of attacks and deaths from smallpox and the percentage of deaths to attacks arranged according to the number of vaccination marks. These figures are reproduced here in order that they may have as wide notice as possible. They show clearly, what was shown last year, that the greater the number of successful vaccination marks, the smaller is the case mortality rate and that the mortality is much the highest amongst those having 'no marks', which may be presumed to mean absence of vaccination.

No. of marks.	Attacks.	Deaths.	Percent- age of deaths to attacks.
0	1,999	519	26.0
1	379	14	3.7
2	573	10	3.3
3	327	5	1.5
4	650	10	1.5

As a further illustration, figures may be quoted which refer to the Karachi municipal epidemic diseases hospital. Of 130 cases of smallpox admitted during 1937, 48 were vaccinated as evidenced by the presence of vaccination marks, 74 were unvaccinated and eight had been unsuccessfully vaccinated. Recoveries totalled 105. No death occurred among the vaccinated but all the 25 fatal cases were amongst the unvaccinated.

These two groups of figures far outweigh the anti-vaccination propagandist's statements regarding "injury resulting from vaccination". As a matter of fact, none of the public health reports for 1937 makes any reference to sickness or death following the vaccination operation.

Vaccination and revaccination statistics.

66. The statistics of vaccination for British India are discussed in a general way in the following paragraphs, but for details reference should be made to the table contained in the appendix to this section (page 303). These statistics, it may be remarked, are for the financial year and not for the calendar year, as is the case for all other figures contained in this report. This arrangement permits the inclusion of all statistics referring to one complete vaccination season, which extends from October to March.

During the year 1937-38, in British India, a slight increase was recorded in the numbers both of primary vaccinations and of revaccinations, the actual numbers being 25,333,383 (10,419,986 primary and 14,913,397 revaccinations) as compared with 23,209,889 (10,404,125 primary and 12,805,764 revaccinations) during 1936-37. This small increase is all the more important when account is taken of the large increases in total vaccinations recorded during recent years. Increased numbers were recorded in most provinces, *e.g.*, Punjab (+2,225,049), Bombay (+359,840), Madras (+170,746), N.-W. F.P. (+116,204), Assam (+71,237), Sind (+69,445), Orissa (+51,953) and Ajmer-Merwara (+5,598). In the Punjab, the number was the highest on record; this was stated to be partly due to changes affected in the routine method employed. Formerly, four insertions were made on individuals vaccinated for the first time and three in the case of revaccinations. The number of insertions during the year was reduced to three and two respectively and the Director of Public Health believes that this change has made vaccination more generally acceptable, whilst still giving an adequate degree of protection against smallpox. The reduction in the number of insertions is, in his opinion, in keeping with modern practice in other countries and has led to economy in vaccine lymph and labour at a time when an anticipated increase in the incidence of smallpox made it desirable to provide an adequate degree of protection to as many persons as possible rather than giving a more intense protection to a smaller number.

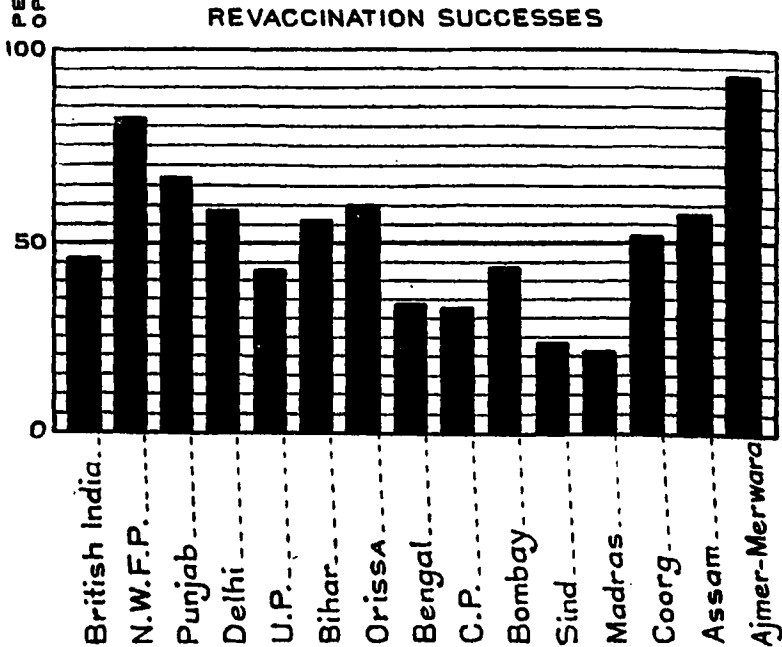
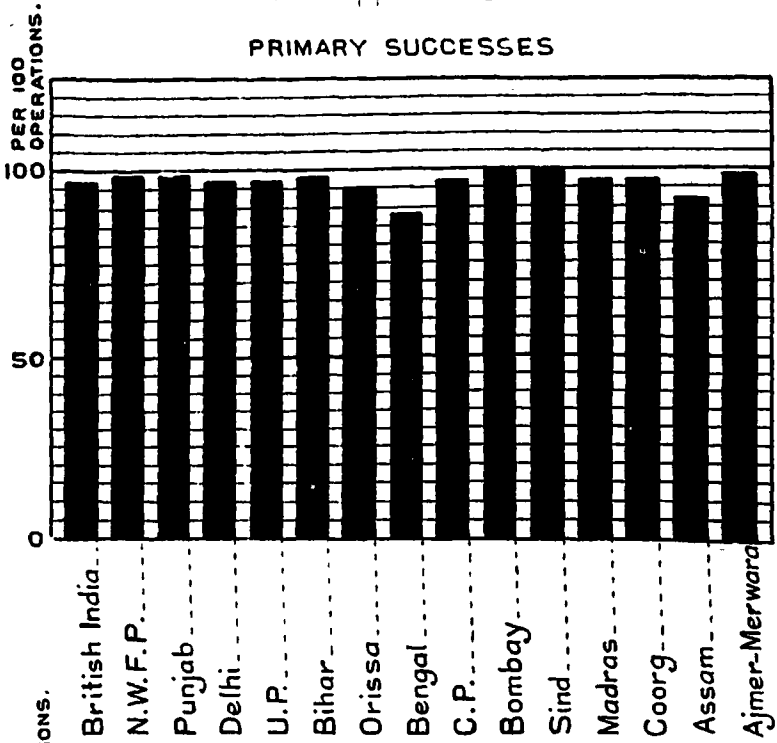
Decreases in the number of vaccinations performed were recorded in Bengal (—668,292), Bihar (—216,394), U. P. (—37,186), C. P. (—13,120), Delhi (—6,685) and Coorg (—4,901). In Bihar the decrease was entirely due to a reduction of revaccination operations owing to a lower incidence of smallpox during 1936 and 1937.

The total number of primary vaccinations performed during the year under review constituted a new record, in spite of the continued apathy of the general public and the usual anti-vaccination propaganda. Part of the gradual increase in vaccination work is no doubt due to improvement in birth registration and to the active efforts of the health staffs. Table VI(i) sets out the numbers of births and vaccinations and the rate of vaccinations performed per 100 births for the past seven years. It will be seen from this table that the number of vaccinations performed per 100 births recorded was nearly 111 during the year under report as compared with 109 during the year 1936 and 106 during the quinquennium ending 1936.

TABLE VI (i).

Year.	No. of births.	No. of primary vaccinations performed.	Rate of primary vaccinations performed per 100 births.
1931	8,814,836	9,012,950	102
1932	8,718,620	9,365,226	107
1933	9,317,918	9,284,821	100
1934	8,923,169	9,506,666	107
1935	9,299,021	10,022,554	108
1936	9,566,379	10,404,125	109
Mean 1932-36	9,165,021	9,716,678	106
1937	9,388,457	10,419,986	111

VACCINATION CHART SHOWING PERCENTAGES OF
SUCCESSFUL CASES TO TOTAL OPERATIONS
DURING 1937-38



Whilst these figures for primary vaccinations give cause for some degree of satisfaction, it must not be forgotten that re-vaccination is almost as important and that every effort should be made by public health departments to wage active campaigns in this direction. Registers of unprotected persons have been opened in almost all villages and municipalities of Madras Presidency and the health staffs in rural areas and the vaccinators and sanitary inspectors in municipalities are given the duty of vaccinating systematically the unprotected adult population with the hope that in 10 years the majority of the adult population in the Presidency will be revaccinated. It is suggested that other provinces should follow this example. During the hot season when vaccination work is frequently suspended, records can easily be brought up to date with the assistance of the vaccination staff.

In spite of continued reluctance to accept revaccination except during epidemics of smallpox, the number of revaccinations remained at a high level as will be seen from Table VI(ii) below:—

TABLE VI (ii).

Years.	No. of revaccina- tions.
1931-32	5,334,148
1932-33	10,082,421
1933-34	11,604,663
1934-35	12,443,590
1935-36	14,011,904
1936-37	12,805,764
Average 1932-33 to 1936-37	12,189,668
1937-38	14,913,397

Notwithstanding these efforts, only about 46 per cent. of the infants available for vaccination in British India were successfully vaccinated during the year. As has been remarked in previous reports, much more remains to be done in this connection, especially in Coorg, Bihar, Orissa, Bengal, Assam and Madras where the corresponding percentages were all between 17% and 39%. It is evident that the vaccination staffs of these provinces have still got a large leeway to make up; the larger the number of unprotected infants, the greater is the risk to the community.

Another point worthy of remark is that many of the primary and re-vaccination operation results were not verified, the actual figures for British India being 6 % and 33 % respectively. In this connection, provincial figures for unverified primary vaccinations were 10% in Madras, 9 % in Bengal, 8 % in Orissa, 7 % in Sind, 7 % in Punjab, 7 % in Delhi, 6% in Bombay and 5% each in N. W. F. P., C. P. and Assam and 1% each in U. P., Bihar, Coorg and Ajmer-Merwara. In the case of revaccinations they were 76% in Bombay Presidency, 52 % in Sind, 46% in Bengal, 41% in Bihar, 33 % in Orissa, 25 % in C. P. and 20% in Madras to 0.36 % in Ajmer-Merwara and 2 % in Coorg.

Success rates.—Success rates for primary vaccinations and for revaccinations in which the results of the operations were verified, are set out in Table

VI(iii) for British India and for the different provinces :—

TABLE VI(iii).

	Percentage of success.	
	Primary.	Revaccina- tions.
British India	97	56
N.-W. F. P.	99	82
Punjab	99	67
Delhi	97	59
U. P.	97	43
Bihar	98	56
Orissa	95	60
Bengal	88	34
C. P.	97	33
Bombay	100	44
Sind	100	24
Madras	97	21
Coorg	97	52
Assam	92	58
Ajmer-Merwara	99	93

The rates for primary cases are generally satisfactory, but the wide variations in the revaccination rates are difficult to understand and would seem to require investigation. This is especially necessary in Madras and Sind where the recorded success rates were only 21 % and 24 % respectively.

Table VI(iv) sets out for rural and urban areas minimum success rates for primary vaccinations and revaccinations, in which results were verified.

TABLE VI(iv).

Provinces.	Minimum percentages achieved.			
	Primary vaccinations.		Revaccinations.	
	Rural.	Urban.	Rural.	Urban.
N. W. F. P.	98	97	73	58
Punjab	96	75	48	4
Delhi	97	97	78	20
U. P.	92	70	20	..
Bihar	..	..	..	..
Orissa	87	87	43	36
Bengal.	55	56	8	..
C. P.	88	4	*	*
Bombay	99	20	97	..
Sind	100	10	72	1
Madras	25	9	82	..
Coorg	97	53	91	28
Assam	66	40	51	8
Ajmer-Merwara	100	62	89	..

Whilst in this report it is not possible to quote the individual towns and rural districts where very low success rates were recorded, it must be stated that some of the figures given in different provincial reports indicate all too clearly that vaccination and revaccination work in certain local areas still receives scant attention. It is very much to be hoped that the provincial public health departments concerned will take note of the pointed references made on this point in these reports and that in future it will be unnecessary to remind them that in vaccination and revaccination we possess a successful

*Information not available.

preventive weapon for the protection of the populations under their charge. There can be little excuse for some of the figures which have been included in the above table.

In British India as a whole, 58 *per mille* of the population were successfully vaccinated during 1937-38. Provincial figures varied from 148 *per mille* in the Punjab to 31 *per mille* in Bombay Presidency; other rates were 91 *per mille* in Bengal, 83 *per mille* in N.-W. F. P., 79 *per mille* in Delhi, 60 *per mille* in Sind, 55 *per mille* in Assam, 54 *per mille* in Ajmer-Merwara, 46 *per mille* in Orissa, 37 *per mille* in Madras, 34 *per mille* each in U. P., Bihar and C. P., and 32 *per mille* in Coorg. As was remarked in last year's report, these figures, taken individually and collectively, continue to show that the percentages of vaccinated persons in this country are still much below those necessary to prevent the recurrence of epidemic outbreaks of smallpox and that further efforts are essential if this disease is to be kept under control.

The average number of vaccinations performed by each vaccinator was 3,099, a figure which cannot be accepted as at all satisfactory. Considerable room for improvement in this direction still exists in most provinces. Figures for the different provinces varied from 9,720 in Punjab, 7,216 in N.-W. F. P., 5,819 in Delhi and 2,780 in Madras to 1,132 in Bihar, 1,239 in Coorg, 1,768 in C. P., 1,831 in Assam, 1,920 in Ajmer-Merwara and 1,963 in U. P.

The average cost of each successful vaccination operation in British India was Rs. 0-3-3. Wide variations were reported from the different provinces, the figure for Coorg being Rs. 1-8-7, for Sind Rs. 0-12-0 and for Bombay Rs. 0-11-2, whilst others were as low as Rs. 0-0-9 in Bihar, Rs. 0-1-7 in N.-W.F. P., Rs. 0-1-9 in Bengal, Rs. 0-7-0 in Madras, Rs. 0-2-0 in the Punjab, Rs. 0-2-8 in Orissa, Rs. 0-3-4 in Assam, Rs. 0-3-9 in U. P. and Rs. 0-3-11 in Delhi.

Compulsory Vaccination.

67. Table VI(v) gives the numbers of towns and districts in the different provinces in which compulsory primary vaccination is in force.

TABLE VI(v).

	Towns			Districts excluding towns		
	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.
British India	1,535	1,208	327	222	105	117
N.-W. F. P.	17	10	7	6	..	6
Punjab	258	245	13	29	27*	2
Delhi	6	6	..	1	1	..
U. P.	439	251	188	48	..	48
Bihar	53	53	..	16	10	6
Orissa	8	8	..	8	2	6
Bengal	119	119	..	27	27	..
C. P.	112	90	22	19	5†	14
Bombay	130	60	70	20	..	20
Sind	27	8	19	8	..	8
Madras	324	324	..	24	24	..
Coorg	5	5	..	1	..	1
Assam	32	25	7	14	9	5
Ajmer-Merwara	5	4	1	1	..	1

* In 9 districts in parts only.

† In parts only.

These details show that vaccination is compulsory only in about 79 % of the towns and in about 45 % of the rural areas. In urban areas, whilst vaccination was compulsory in all towns of Delhi, Bihar, Orissa, Bengal, Madras, and Coorg, it was only in force in about 30 % of those in Sind and in 46 % of those in Bombay Presidency. In the rural areas, vaccination was only compulsory throughout Delhi, Madras and Bengal ; in Punjab 93 % ; in Assam 64 % ; in Bihar 62 % ; in C. P. 26 % and in Orissa 25 %. Vaccination was not compulsory in any of the rural areas of N.-W. F. P., U. P., Bombay, Sind, Coorg and Ajmer-Merwara. In Orissa, the question of making vaccination compulsory throughout the province was under the consideration of the provincial government.

Since the annual numbers of vaccinations performed are not sufficiently large to protect the population fully from infection, and the enforcement of the compulsory vaccination of young infants alone cannot entirely control small-pox, stress must again be laid on the necessity for carrying out revaccinations among children before school age and again during adolescence. Revaccination of school children is now being insisted upon before they are admitted to school in Delhi. This measure was introduced late in 1937 and it may be anticipated that it will be followed by a large increase in the protected population.

In certain localities where vaccination is not compulsory and opposition to vaccination is met with, resort may be had to regulations under the Epidemic Diseases Act, 1897 (III of 1897). Even where vaccination is compulsory, people either from ignorance or apathy fail to comply with the requirements of the Vaccination Acts. In this connection it is noted that 200 prosecutions were instituted under the Act in Karachi, Hyderabad, Sukkur, Shikarpur, Rohri and Larkana towns ; of these 174 persons had their children vaccinated before the cases were heard, so that further action was unnecessary. In the Punjab, 2,414 prosecutions were undertaken for failure to comply with the requirements of the Vaccination Act ; 25,430 notices were issued and 15,292 were received by the district and municipal officers notifying movements of unvaccinated children between one district to another and one town to another. In Bombay Presidency, 43 prosecutions were instituted and in 23 the cases were withdrawn, the defaulters having complied with the provisions of the Act. These figures indicate the educative value of and the possibility of obtaining useful results by a few selected prosecutions in different areas.

Revaccination is not compulsory except in Madras Presidency and in the plains of Ganjam district in Orissa. In the absence of smallpox outbreaks, revaccination is not a popular measure, although the common experience is that, immediately smallpox appears, large numbers of persons, and not only those belonging to the uneducated part of the community, are only too willing to obtain the protection conferred by vaccination. There can be no question that, if compulsory revaccination were generally enforced, a large reduction in the incidence of smallpox would result to the great benefit of the whole population.

Vaccine Institutes and Supply of Vaccine.

68. Glycerinated lymph continued to be used throughout British India. The N.-W. F. P. as usual obtained its supplies from the Punjab Vaccine Institute and the provinces of Sind and Orissa continued to obtain their requirements from the Vaccine Institute at Belgaum and Bihar Government's Vaccine

Depot at Namkum respectively. Table VI(vi) gives details of the lymph produced by and issued from provincial institutes :—

TABLE VI(vi).

Vaccine institutes.	Output in doses.	Issues in doses.
N.-W. F. P. } Punjab	12,220,950	10,503,37 ⁵
U. P., Patwa Dangar	4,016,750	3,027,393
Bihar, Namkum (Ranchi)	2,933,190	3,048,908
Bengal, Calcutta	12,666,920	10,002,554
C. P., Nagpur	759,520	679,905
Bombay, Belgaum	1,937,215	1,810,980
Madras, Guindy	4,139,000	3,500,260
Assam, Shillong	1,004,720	1,040,770

The quality of the lymph issued was everywhere reported to be of high standard. In the Punjab, all vaccine lymph was subjected before issue to a bacteriological test and to a clinical test on children. In U. P., bacteriological tests of the lymph were carried out on every batch before issue. The results obtained showed complete absence of streptococci and gas-producing anaerobes, whilst the number of viable organisms per c.c. of vaccine lymph was less than the prescribed standard of 5,000 in all samples issued. All samples were chloroformed and were issued only when subsequent tests showed adequate reduction of organisms. The standard of bacteriological purity of vaccine lymph achieved was the same as is laid down in the British Pharmacopœia. Pathogenicity or toxicity tests on guinea-pigs were also performed as a routine measure and the potency test on rabbits was made with every batch. Contents from several samples were pooled and then tested on rabbits in various dilutions ranging from 1 in 500 to 1 in 8,000. With the improved quality of vaccine lymph, it was possible to start the vaccination season from 1st October instead of from 1st November. In C. P., each brew was tested by actual vaccination for purity and potency of lymph before it was issued for general use. In Bombay, the purity and potency of all lymph were as usual tested. At the King Institute, Guindy, the practice of adding 0.1 per cent clove oil to all issues of lymph was continued and, as usual, the lymph was subjected to rigid bacteriological test, both on manufacture and at the time of issue. The potency of lymph, as judged by laboratory tests, continued to be satisfactory. In the Saidapet range, where all lymph issued is first tested, the results were also satisfactory, giving in 2,157 primary vaccinations a case success rate of 99.5 per cent. and an insertion success rate of 98.6 per cent. The lymph was issued in a dilution of 1 in 5 throughout the year.

Lymph yields.—Great variations are noticeable in the yields of lymph obtained at the various vaccine depots from buffalo and ox-calves. These variations lead to the inference that different methods are employed in different depots. It might be useful therefore for superintendents-in-charge to exchange information through the office of the Central Advisory Board of Health in order that more uniform yields might be obtained. It is obvious that the greater the yield per animal, the fewer calves would be required, and this would result in reduction of production costs. In the Punjab, 285 buffalo calves, 13 cow calves and 18 rabbits were vaccinated; of these 256 buffalo calves, 12 cow calves and 14 rabbits yielded lymph but the remainder failed to react. The average yield of lymph obtained per successfully vaccinated buffalo calf was 128.3 grammes, per cow calf 41.8 grammes and per rabbit 1.3 grammes, as against 113.31, 31.3 and 1.9 grammes, respectively, in the previous year. These figures show that the average yield of pulp per animal successfully vaccinated has considerably increased. In the

U. P., the vaccine pulp obtained from 403 successfully vaccinated animals gave an average yield of 80.4 grammes per animal (cow and buffalo-calves) against an average yield of 67.96 grammes per animal obtained from 369 animals,—another appreciable increase. The average yield of pulp from cow and buffalo-calves separately was 33.75 and 81.35 grammes, respectively, as compared with 33.2 and 70.48 grammes in the preceding year. In this province, 1,350 grammes of seed lymph (1 in 5) from eight hill cow-calves were also prepared as compared with 4,150 grammes from 25 calves in the preceding year. In the C. P., 202 animals comprising seven buffalo calves, 193 cow calves and two rabbits were used for lymph production. Of these, nine cow calves were rejected because of unsatisfactory results. The average out-put of lymph was 80.87 grammes per buffalo calf, 34.90 per bovine calf and 1.05 per rabbit. The average yield per calf obtained at the King Institute, Guindy, was 27.6 grammes as compared with 28.1 grammes last year. At the Vaccine Institute, Shillong, the yield averaged 44.41 grammes. The average yield obtained per cow calf at the Numkum institute was 33.31 grammes and 51.76 grammes per buffalo calf; at Belgaum institute 23.38 grammes per cow-calf and at Calcutta institute 27 grammes per cow calf.

Experimental work.—Vaccine institutes are, however, not only mere factories for the production of lymph; experimental and other investigations are always in progress with a view to improvement of their vaccine lymph.

At the King Institute, Guindy, various attempts were made to prepare dried lymph, till recently without much success. It was found that whichever method of drying was employed, the dried lymph showed considerable loss of potency when compared with the routine glycerinated lymph. Attempts to prepare potent dried lymph were renewed during the year under review, following the observations of Rivers, who showed that vaccinia virus cultured on the chorio-allantoic membrane could be well preserved in the dried state, when the virus was first mixed with gum acacia and subsequently dried rapidly *in vacuo*.

The technique of drying was as follows:—

“Five grammes of crude lymph were mixed with five grammes of 30 per cent. solution of gum acacia, with a view to absorb the virus, and 20 grammes of tyrode solution and thoroughly ground. This represented a 1 in 6 dilution of lymph, with five per cent. solution of gum acacia. The emulsion was placed in ampoules, rapidly frozen in dry ice and simultaneously dried *in vacuo* over P_2O_5 . After drying was effected, the ampoules were sealed when still connected with the vacuum apparatus. The dried lymph was thus preserved *in vacuo*. The ampoules were then kept at ordinary room temperature, and tested periodically on rabbits to determine potency. The same batch of lymph ground in 50 per cent. glycerine water and preserved in cold storage (40°F.) served as a control. The results are given in the following table:—

Comparative potency of dried lymph and glycerinated lymph (Control).

Date of preparation—9th March 1937.

Period of observation: March to September 1937—7 months.

T°.	7 days.		1 month.		3 months.		7 months.	
	Average	Cold storage.	Average	Cold storage.	Average	Cold storage.	Average	Cold storage.
	80°F.	40°F.	82°F.	40°F.	88°F.	40°F.	84°F.	40°F.
Dilutions.	Dried lymph.	Control lymph.	Dried lymph.	Control lymph.	Dried lymph.	Control lymph.	Dried lymph.	Control lymph.
1—10 . . .	Take	Take	Take	Take	Take	Take	Take	Take
1—100 . . .	“	“	“	“	“	“	“	“
1—500 . . .	“	“	“	“	“	“	“	“
1—1,000 . . .	“	“	“	“	“	“	“	“
1—5,000 . . .	“	“	“	“	“	“	“	“
1—10,000 . . .	“	“	“	“	“	“	“	“

This method of preserving lymph would appear to have useful applications in many fields and might be useful for military purposes where facilities for cold storage were not readily available.

In U. P. (a) the quality of seed lymph was further improved by careful animal passages and by the method of selection started in 1934-35. This resulted in a 75 % increase in the average yield of pulp in the case of buffalo-calves and one of 175 % in cow-calves; (b) field tests on children in certain municipalities were started and the vaccine, giving approximately 100 % case success rates and almost the same percentage of insertion success rates in primary cases, was issued subsequently for use in the province whilst the comparative value of the field test on children and the potency-test on rabbits was established; (c) deterioration in vaccine lymph, if any, by the use of chloroform was investigated; four samples chloroformed for the first time on the day of preparation and subsequently again after seven months retained their potency at a satisfactory level and yielded good results; and (d) the period required for satisfactory reduction in the number of organisms in vaccine lymph by the action of glycerine at cold room temperature of 32°F. was investigated and it was found that the usual time required was four to six months.

At the Punjab Vaccine Institute, investigation of the immunity against vaccination amongst buffalo calves used as vaccinifers for the production of vaccine lymph was undertaken and experiments were conducted on rabbits and buffalo-calves. It was found that animals which had suffered from an attack of cowpox retained sufficient anti-bodies in their system for at least eight weeks so as to render them immune to further attacks by artificial means.

In Bihar, it was found in the seed regeneration cycle that the rabbit pulp used for vaccination of the buffalo calf should be as fresh as possible and that the paste from the crude pulp from a rabbit should be made immediately after scraping and applied on the buffalo calf. The experiment of mixing one per cent carbolic acid solution in vaccine lymph was found to be unsuitable as the vaccine lymph deteriorated more quickly in outside temperatures. The dilution test for potency of lymph was introduced and all samples were tested on calves at a dilution of 1 in 1500 before issue. It was also found that crude pulp if preserved in cold storage in crude form for about a year retained its full potency. Whether the vaccine so prepared will keep full potency in outside temperatures was being investigated.

At the Vaccine Institute, Belgaum, a series of vaccine lymph samples manufactured during 1936 were used during the year under review in order to ascertain whether the quantity gained by vaccinating larger areas in the calf affected the quality of the "take" on children. It was found that there was no appreciable difference on children as seen on the eighth day after vaccination.

Training.—In the Punjab, during the period from November 1937, to March 1938, several untrained vaccinators, 132 private individuals and 64 students of the Unani Tibbia College were trained at the Punjab Vaccine Institute, Lahore, in the elementary principles of hygiene, the method of preparation of vaccine lymph and the technique of vaccination. In addition, a series of ten lectures and demonstrations in vaccination was given to the sanitary inspectors class during the session 1937-38. In C. P., the seven weeks' course of training for vaccinators included instruction in vaccination, hygiene, epidemiology, vital statistics and ambulance. Three vaccinators on reserve duty and 79 private candidates were trained. In Bombay Presidency, a training class for vaccinators was held as usual at the Vaccine Institute, Belgaum; 18 candidates were trained and all passed the final examination. One inspector of sanitation and vaccination, one chief sanitary inspector, one sanitary inspector and one candidate deputed by Hyderabad (Sind) municipality were given special training in the preparation and preservation of lymph and in the theory and practice of vaccination.

Provincial Vaccination Staff.—The staff employed on vaccination work in British India included vaccinators. Table B in appendix IV indicates that many of the provinces employ no female vaccinators, whilst in others the numbers of women vaccinators were inadequate to meet the urgent needs of the female parts of the population. The employment of women vaccinators should be extended in every province, as it is always difficult and sometimes impossible, for male vaccinators to carry out this work among women and children.

The vaccination staff employed in N.-W. F. P. comprised six superintendents of vaccination and 52 vaccinators, three of the latter being temporarily employed for short periods in the Hazara and Mardan Districts; these numbers showed an increase of five over the staff employed during the previous year. In the Punjab, the staff employed by local bodies increased from 563 to 577 vaccinators; the special provincial vaccination staff of one superintendent and 13 vaccinators remained unchanged. Amongst the special staff, two of the vaccinators worked in the Punjab Vaccine Institute throughout the year, three were attached to the institute for the period October, 1937, to March, 1938, to help in the production and distribution of vaccine lymph during the vaccination season, whilst the remaining staff worked in 30 localities in connection with outbreaks of smallpox, routine vaccination and the checking of birth and death registers. The number of women vaccinators in this province has increased, ten having been employed during the year; nurse *dais* also carried out vaccination work during the course of their routine duties. In the U. P., the number of assistant superintendents of vaccination (49) remained unchanged, but the vaccinators further decreased from 968 in the previous year to 953. In Bihar, the staff comprised nine inspectors and 20 sub-inspectors of vaccination. The total number of vaccinators employed was 1,184 of whom 83 were employed in towns and 1,101 in rural areas. In this province, vaccination is performed by paid vaccinators in municipal areas, whilst licensed vaccinators are generally employed in the rural areas. Each district is divided into suitable small areas and a licensed vaccinator, with an apprentice, is permitted to carry out vaccination within his area. He is empowered to charge a fee of two to four annas for each vaccination operation performed in a house. In areas where the Vaccination Act is in force free vaccination depots are provided and these are attended by the vaccinators on fixed days each week, no fee being charged. Paid vaccinators are also employed by local bodies for short periods to deal with outbreaks of smallpox, and Government provide for the temporary appointment of 100 vaccinators every year for such periods as are considered necessary. In Orissa, the provincial vaccination inspecting staff consisted of two district inspectors of vaccination, four sub-inspectors of vaccination, 19 health inspectors and 34 vaccinators. The total number of vaccinators employed was 265, of whom 12 were employed in towns and 253 in rural areas. Vaccination is performed by paid vaccinators in the municipal areas and also in the districts of Ganjam and Koraput; licensed vaccinators are generally employed in the rest of the province. Vaccination in rural areas is arranged generally in the same way as in the province of Bihar. In the C. P., the staff comprised 16 civil surgeons who are superintendents of vaccination, 35 district assistant superintendents of vaccination and 356 vaccinators. In Bombay there are 25 inspectors of sanitation and vaccination and 341 vaccinators; in Sind, five inspectors of sanitation and vaccination and 63 vaccinators; in Madras, 266 health inspectors, 267 class I vaccinators and 554 class II vaccinators; in Coorg, six sanitary assistants; in Delhi, 15 and in Ajmer-Merwara 16 vaccinators. In Assam, vaccination is carried out by 451 vaccinators, comprising 386 local board, 30 municipal and 35 Government

vaccinators. Among the labour forces on tea estates the work is done by the tea garden medical officers. Railway employees are vaccinated by the railway medical officers and in jails vaccination was performed by the sub-assistant surgeons in medical charge. The inspecting staff in the province consisted of nine inspectors and 30 sub-inspectors of vaccination.

Indian States.

69. *Punjab States*.—Statistics of some Indian States which maintain their own establishments are given below :—

	Vaccinations.		Success-rates.	
	P.	R.	P.	R.
Patiala . . .	60,285	42,090	98	76
Bahawalpur . . .	41,952	7,228	95	93
Nabha . . .	12,502	1,474	100	60
Jind . . .	14,275	1,978	99	47
Kapurthala . . .	9,066	7,232	98	57
Faridkot . . .	9,480	4,093	99	44

SECTION VII.

PUBLIC HEALTH WORKS.

70. From the public health point of view, present-day civilisation demands many public amenities, these including a good water supply, a modern up-to-date drainage system, a sewage collection and disposal system, good roads, sanitary markets and slaughter houses and public parks. Realising the desirability of disseminating information in respect of these amenities, the Central Advisory Board of Health at its inaugural meeting agreed that, as a Central Information Bureau, it should make arrangements to obtain from provinces and States sets of the public health type-designs now in use and copies of all bye-laws dealing with public health subjects. A considerable amount of material has since been collected from different parts of India and is in course of distribution. It is hoped that this will be of use to all concerned.

"The application to rural areas of the solutions of the problems of sanitation and sanitary engineering found applicable to urban areas is limited by a number of factors such as expense, ignorance of the people and low standards of living. It is therefore necessary to evolve methods which combine reasonable efficiency with low cost and low maintenance."

With this in view, the Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene held in Java in August, 1937, passed the following resolutions in the hope that action would be taken by all Governments concerned :—

- "The Conference recommends that Eastern Governments should each constitute committees for small village planning in order to avoid "*laissez faire*" development, and that these same agencies should set up local standards dealing with details regarding siting, types of houses, building material, ventilation, lighting and heating, waste disposal and water supply. In particular, it is emphasised that the kitchen should not be inside the living part of the house and that cattle-sheds should be detached."
2. "The Conference suggests that a good water supply should be provided in all rural areas."
 - "The Conference further suggests that, when possible, grants from public funds should be made available to provide good water and that financial return on such schemes should not be a matter of primary consideration."
 - "The Conference recommends that new water supplies delivered to rural areas should be of the same recognised standard of purity as those approved for delivery to large towns; no new pipe-line supply should be installed unless the purity of the water conforms to this standard."
 - "Where the supply of water of the above-mentioned quality is not feasible, it is recommended that properly constructed wells with cover and pump should be provided where possible; existing wells should be improved, and requirements to prevent contamination of wells should be promulgated."
3. (a) "The Conference is of the opinion that the proper disposal of human excreta is of the utmost importance to the health of the rural population."
- (b) "In those Eastern countries where the use of manure for agricultural purposes is of primary importance, human excreta and household refuse should be dealt with in a way suitable for placing the product on the land as manure."
- (c) "The question of the pollution of water in wells by pit latrines is a matter that needs further investigation, and it is recommended that Eastern Governments should consider undertaking such investigations."
4. (a) "The Conference recommends that more research work concerning flies should be undertaken, and suggests that it should be based on the lines indicated by the League of Nations document C. H. Hyg. rur. E. H. 15 (I)."
- (b) "The Conference recommends that the programme of study should also include investigations into the alleged efficacy of dung and refuse-stacking and of composting as a means for the prevention of the breeding of flies."

From earliest times, one of the first steps towards advance in public health has always been the provision of a public water supply. In the ruins of ancient cities, like Humpi in South India, the remains of aqueducts can still be seen, giving proof of the existence centuries ago of highly developed sanitary engineering. Unfortunately, even today, few of India's towns possess sufficient and satisfactory water supplies. Moreover, modern requirements demand large quantities of water per head per day and it is not always easy to obtain a sufficiency of wholesome water to meet these demands at a cost within the financial capacity of the urban populations. In this connection, however, it is interesting to note that the capital cost per head of the urban populations supplied with water in the United Provinces amounts to approximately Rs. 18 as compared with Rs. 27 to Rs. 67 in Great Britain in pre-war days. In order to encourage development of water schemes, it may be added that in the United Provinces during the year ending March 1937, excluding capital expenditure and advance payments made on account of interest and sinking fund charges, a net profit of Rs. 5.72 lakhs was realised on the undertakings managed by local authorities. For the year ending March, 1938, the corresponding profit was Rs. 2.38 lakhs. These figures indicate that, apart from the boon to the public which a safe water supply confers, expenditure on this public health amenity can be a sound investment.

From the list of towns given in Table A in the Appendix to this section of this report, it will be seen that, out of a total of 1,226 towns, only 233 or 19 per cent. possess a protected piped water-supply. These figures, however, give a somewhat erroneous impression because nearly 54 per cent. of the total urban populations included in the table enjoy this public health amenity. Of the towns with a population of over 50,000, about 82 per cent. now have piped water; of those with a population ranging between 30,000 to 50,000 about 55 per cent. come into this category; whilst of towns with a population below 30,000 the proportion is as small as 12 per cent. Table VII (i) gives consolidated figures in percentages for British India and for individual provinces.

TABLE VII (i).

	Percentage of towns having protected water supply.	Percentage of population.
British India	19	54
N.W. F. P.	47	69
Punjab	22	54
Delhi	83	98
U. P.	6	33
Bihar	14	51
Orissa	25	35
Bengal	39	62
C. P.	8	33
Bombay	23	67
Sind	15	64
Madras	51	71
Coorg	50	61
Assam	32	49
Ajmer-Merwara	20	12

In last year's report mention was made of the inadequacy of water-supplies in many rural areas and attention was drawn to the investigations being made by provincial Governments at the request of the Government of India. It may be noted here that the Government of Madras have launched a scheme for the provision of protected water supplies to all villages in the Presidency. For this purpose, priority lists of villages have been prepared for the years 1937-38 and 1938-39, keeping in view the perennial or partial scarcity of water, distances from sources of supply, the prevalence of water-borne epidemic and endemic diseases and the occurrence of markets and fairs and festivals. A ten-year scheme commencing from 1939-40 is under preparation and it is proposed to provide a protected water supply to every village within that period. The provincial Government has sanctioned a grant of Rs. 1,08,000 for 1937-38 and has allotted Rs. 6,000 to each of 18 districts, excluding six where water scarcity is not an acute problem. It is suggested that other provinces should follow this example. Details of the action taken by other provinces will be found in later paragraphs of this section of the report.

As regards drainage and sewerage works, these sanitary amenities should always keep pace with the installation of piped water supplies in urban areas, otherwise increased difficulties are certain to be experienced. Few towns in India, however, have modern drainage and sewage purification works. Tables VII (iii) and VII (iv) indicate the attention so far given by the provinces towards these essential public health requirements.

A great deal also remains to be done in providing hygienic markets and slaughter houses. These would go a long way to prevent the contamination of food supplies which is so common a feature in Indian towns. The total expenditure incurred by urban authorities on markets and slaughter houses during the year 1936-37 is given below for a number of provinces.

TABLE VII (ii).

	Rs.
Punjab	93,570
U. P.	Not available.
Bihar	40,753
Orissa	16,071
Bengal	54,112
C. P.	1,00,810
Bombay	2,88,992
Sind	91,301
Madras	1,31,264
Assam	34,494

The report of the Inter-Governmental Conference on Rural Hygiene held in Java in August, 1937, contains an important statement in connection with the relationship between construction works and the production of conditions favouring the development of malaria. That statement is so important that no apology need be made for reproducing it in this report.

"Although in some Far Eastern countries a fair degree of co-operation has been developed between health officers and engineers in respect to the avoidance of malaria, yet the amount of *engineer-made malaria* in other countries is appalling Co-operation with the health authorities

would obviate many of these unfortunate occurrences at little or no additional cost. In other instances, the expenditure of such additional sums as would be necessary to avoid the production of malaria would be justifiable, because it is almost invariably found that the cost of remedial measures is disproportionately greater than the added initial outlay required to prevent malaria."

There is no doubt that in India one could cite numerous instances of man-made malaria. The engineer naturally devotes every effort to completing his projects as economically as possible, but he often has failed to realise how disastrous his operations may be to the health of the very people which the schemes are intended to benefit. In order to avoid these unfortunate results in future, the Malaria Survey of India has prepared a Health Bulletin entitled "The prevention of malaria incidental to engineering construction" which lays down the general principles to be observed in carrying out construction works of different kinds, so as to obviate the creation of conditions favourable to mosquito breeding and to the spread of malaria. This Health Bulletin not only instances errors by which in the past the incidence of malaria has been increased but outlines the precautionary methods which should be adopted to prevent similar occurrences in the future. It is to be hoped that all engineers in this country will make a careful study of this valuable brochure and will take steps to follow its recommendations in future construction works, wherever these may be located.

In Delhi Province, and particularly in and around the cities of Old and New Delhi, the high incidence of malaria has given cause for considerable anxiety during recent years. Since 1935, the problem of prevention has received serious attention and, after careful surveys made by the officers of the Malaria Survey of India, a number of large engineering projects were prepared in consultation with the same expert malariologists. By the end of the year under review, permanent works costing over Rs. 11.0 lakhs were either completed or were nearing completion, whilst further works costing over Rs. 1.25 lakhs were expected to be completed before the onset of the 1938 monsoon. It is satisfactory to be able to report that very successful results have been achieved, the incidence of malaria in and around the two cities having already fallen to a marked extent. Further details of these anti-malaria schemes will be found in the paragraph relating to malaria and anti-malarial measures in Section II of this report.

EXPENDITURE.

In Tables VII (iii) and VII (iv) details are given of public health expenditure by municipal committees and district boards in the different provinces during 1936-37. The figures indicate that in municipal areas public health expenditure during the year under review ranged from 20 per cent. to 39 per cent. of the total income, whilst in the case of district boards the figure was in some cases as low as three per cent. and in none higher than 21 per cent. Some of the latter percentages in particular are totally inadequate and until the authorities concerned are prepared to spend a reasonably high proportion of the funds at their disposal on the primary essentials of environmental hygiene, little improvement need be expected in the standard of health of the people.

TABLE VII (iii).

EXPENDITURE BY MUNICIPALITIES.

	Income.	Public Health Expenditure.	Percentage of total income expended on public health.	Expenditure on—			Percentage of Cols. (4) to (6) to Col. (2).
				Conservancy.	Water-supply.	Drainage.	
	1	2	3	4	5	6	
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA	12,38,41,568	3,55,35,169	29	1,32,45,668	88,05,798	45,42,739	75
N.-W. F. P.	23,86,950	5,24,109	22	2,32,644	1,17,861	63,125	79
Punjab	1,96,47,967	46,40,190	24	17,11,558	11,92,594	10,01,322	84
Delhi	74,81,683	18,42,589	25	4,72,072	8,83,051	1,07,931	79
U. P.	Not available.			Not available.			
Bihar	63,43,637	21,61,760	34	10,81,176	4,62,980	4,71,613	93
Orissa	7,70,204	2,84,619	37	2,01,916	27,503	12,602	85
Bengal	1,25,88,630	49,06,338	39	24,38,844	11,87,191	3,68,388	81
C. P.	88,97,947	22,32,407	25	11,46,977	5,68,505	2,10,361	86
Bombay	2,32,71,336	68,08,590	29	26,11,799	21,43,845	11,97,522	87
Sind	1,32,67,897	46,09,022	35	8,47,371	6,15,402	5,09,457	43
Madras	2,75,84,288	69,15,930	25	21,95,779	14,37,741	5,67,423	61
Assam	16,01,029	6,09,615	38	3,06,532	1,69,116	32,995	83

TABLE VII (iv).

EXPENDITURE BY DISTRICT BOARDS.

	Income.	Public health expenditure.	Percentage of total income expended on public health.	Expenditure on—			Percentage of Cols. (4) to (6) to Col. (2).
				Conservancy.	Water-supply.	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA	19,82,14,453	1,64,22,925	8	13,96,882	20,52,378	71,559	21
N.-W. F. P.	18,47,277	68,857	4	6,236	11,002	...	25
Punjab	2,40,22,629	30,58,040	13	...	Not available.	...	...
Delhi	2,79,275	21,179	8	...	...	...	...
U. P.	2,24,62,343	6,07,563	3	6,510	12,136	5,189	4
Bihar	1,93,91,795	6,83,543	4	3,82,999	1,73,760	5,037	82
Orissa	29,98,583	2,02,007	7	11,455	54,733	480	33
Bengal	2,49,80,947	52,43,999	21	...	9,41,634	57,794	19
O. P.	1,04,12,261	4,68,710	5	...	77,258	1,438	17
Bombay	2,20,39,870	6,71,334	3	...	3,49,464	...	52
Sind	49,70,923	2,38,203	5	5,703	30,475	...	15
Madras	6,05,52,025	45,28,089	7	9,83,979	3,35,787†	...	29
Assam	42,56,525	6,81,401	15	...	66,129	1,621	11

The details contained in these tables indicate that the bulk of the expenditure on public health was made on the three items of conservancy, water-supply and drainage. In urban areas the percentage to the total varied from 72 per cent. to nearly 93 per cent.; in rural areas, the corresponding figures varied between 7 per cent. and 82 per cent. of the total.

As an instance of the ridiculously small expenditure on sanitation being incurred by district boards in certain parts of the country, Table VII (v) has been reproduced from one of the provincial health reports. This table gives in two columns the expenditure in '*pies*' *per capita* (a) including

* Excluding the United Provinces.

† Includes expenditure on drainage.

and (b) excluding water-supply and drainage in 16 districts. As in some of these districts, the local authorities were in receipt of Government grants towards the maintenance of health organisations the figures quoted are even worse than they would seem to be.

TABLE VII (v).

District Boards.	Expenditure <i>per capita</i> including water-supply and drainage.	Expenditure <i>per capita</i> excluding water supply and drainage.
	Pies.	Pies.
(1)	7.33	5.50
(2)	5.33	4.60
(3)	1.67	1.25
(4)	2.75	2.67
(5)	2.00	1.33
(6)	3.50	2.33
(7)	4.50	2.50
(8)	3.33	1.50
(9)	4.33	4.00
(10)	6.50	3.20
(11)	0.80	0.50
(12)	1.25	0.80
(13)	0.80	0.25
(14)	1.80	1.50
(15)	2.67	1.67
(16)	0.20	0.05

North-West Frontier Province.

71. Public health expenditure by municipal committees, notified area committees and district boards decreased as compared with the previous year. Government grants-in-aid for public health purposes also further decreased amounting to Rs. 4,036 in the case of municipalities and notified area committees and to Rs. 1,000 in the case of district boards.

None of the towns of this province has so far got an infectious diseases hospital. Arrangements for the collection, removal and disposal of human excreta and street refuse are everywhere primitive. Rubbish is dumped in heaps outside residential areas and is eventually removed to be used as manure; practically no trenching or rubbish pits are in use. The provision of sanitary markets is another matter which requires urgent attention from all municipal authorities.

In the rural villages, conditions are even worse. No piped water supplies are available and cleansing staffs, drainage arrangements and sanitary control of food supplies are all non-existent. The control of infectious disease in the rural population is a further question which receives no attention.

Punjab.

72. Sanitary conditions in urban areas can only be described as generally deplorable, conservancy systems in vogue being extremely primitive and drainage usually unsatisfactory. Few towns are equipped with proper drains

and where these do exist, regular cleansing and flushing are not effectively carried out. The usual open shallow wells were, however, being gradually improved by the provision of hand pumps.

In the rural areas, the efforts of the public health department were chiefly concentrated on the provision of partial protection of water-supplies in the form of hand pumps, and on drainage. During the year 378 new wells were constructed, 2,447 wells were repaired, 5,802 pumps were installed and *pucca* drains to the extent of 443,225 feet were laid. New refuse pits to the number of 75,153 were constructed. Out of a total of 35,871 villages in the province sanitary work of one kind or another was undertaken in 9,013. Completely "sanitated" villages in which the water-supply had been protected, main drains for the removal of waste water were constructed and arrangements made for the removal of filth and refuse increased from 382 in 1936 to 1,962 during the year under review.

As regards the development of public health engineering works, progress was maintained; several important schemes were commenced, a number of new pumping plants and other mechanical installations were installed or were in course of installation and mechanical installations with a total of 9,250 B. H. P. were complete or were in course of installation in connection with government or municipal public health engineering works. Upwards of sixty important public water-supply schemes, with a daily capacity of twenty-three millions of gallons of water were completed or were under construction. A feature of more recent development in this direction is the number of rural water-supply schemes in the course of design or construction. Twenty-one borings for tube-wells were in hand and a considerable number of shallow tube-wells were sunk and provided with hand-pumps.

Twenty-one important water-supply and drainage schemes were maintained and operated by the public health circle of the engineering department on behalf of local bodies. The superintending engineer reported once more that the standard of cleanliness and sanitation generally observed, in urban areas, with few exceptions, remained unsatisfactory; that many municipal drainage and water-supply works under the control of the local bodies were in a defective state and that their efficiency was impaired because of neglect or failure to maintain them in a suitable manner.

Three preliminary and six new detailed Government projects were prepared by the sanitary engineering department and previous estimates for one preliminary and two detailed projects were revised during the year. The most important of these were (1) air-conditioning installation in the Lahore High Court (Rs. 5,12,587); independent water-supply and drainage for the new civil hospital at Ferozepore (Rs. 37,000); and sanitary installation for three new blocks at the Lahore male mental hospital (Rs. 37,594). Three preliminary and 13 detailed projects were prepared and three preliminary and three detailed projects were revised for local bodies. These included the Lahore sewerage and drainage scheme (Rs. 2,44,44,160); the Lahore water-works reorganisation scheme (Rs. 72,00,000); Dera Ghazi Khan drainage scheme (Rs. 9,42,478); Gojra water-supply extensions (Rs. 1,03,272); Vehari Mandi drainage, Part II (Rs. 82,513); Kalka drainage scheme (Rs. 47,187); Sant Nagar, Krishan Nagar, Ram Nagar and Rajgarh drainage scheme in Lahore (Rs. 1,97,854); Kundwal and Kundal village water-supply in Jhelum district (Rs. 76,114) and Jullundur City drainage extensions, Part II (Rs. 61,443).

The permanent gravity water-supply system at Nurpur fair in Rawalpindi district functioned satisfactorily during the fair period and also afforded a good and safe water-supply for the neighbouring village throughout the year. A special water-supply installation based on the Choa spring was put into operation and ample supplies of filtered water were delivered throughout the fair area on the occasion of the Choa and Katas fair in Jhelum district, when 929,800 gallons of water were distributed. The permanent gravity water-supply system at Jwala Mukhi Fair in Kangra district functioned throughout the year supplying water both to the small town of Jwala Mukhi and during the fair period. It had, however, to be supplemented by a power driven Boulton elevator installed in a well in the village. The permanent tube-wells, reservoirs and extensive water-supply equipment at the site of the Sun Eclipse Fair in Thanesar were maintained in readiness although no fair was held during the year. Pumping plant from this area was lent to the Karnal District Board for the Pehowa fair held in that district, about 1,400,000 gallons of water being supplied. A special water-supply scheme at a cost of Rs. 14,739 at the site of the Phalgu fair in Karnal district was carried out with funds supplied by Government for the fair held in September 1937. A water-supply project, estimated to cost Rs. 40,600 was prepared for Baba Farid fair area in Montgomery district, the proposed source of supply being a tube-well, whilst Sakhi Sarwar fair water-supply scheme in Dera-Ghazi Khan district was in hand at an estimated cost of Rs. 42,843.

A sum of Rs. 4,85,740 was placed at the disposal of the Sanitary Board, Punjab, during the year under review for grants-in-aid to urban and rural local bodies. Of this total Rs. 1,89,822 was spent in urban and Rs. 3,01,991 in rural areas. Of the former, important schemes included Pind Dadan Khan water-supply (Rs. 75,000); drainage extension scheme in Mandi Baha-un-Din (Gujrat) Rs. 22,975; Abohar water-supply extension (Rs. 17,782); Ambala City water-supply (Rs. 15,793); and Ambala Sadar Bazar water-supply (Rs. 13,454). Rural works included Bit Ilaga water-supply in Hoshiarpur district (Rs. 1,06,000); Jhelum rural water-supply extension in villages Kundal and Kundwal (Rs. 57,000); Kulu water-supply scheme, Kangra (Rs. 30,000); and Pakpattan Baba Farid Fair area water-supply in Montgomery district (Rs. 20,300). The Board continued to tender advice in respect of all sanitary works and accorded administrative approval to a number of schemes.

Delhi.

73. The need for a new slaughter house for New Delhi was agreed upon in principle by the Municipal Committee and formal approval of the Chief Commissioner was awaited.

There was no change in the method employed for refuse disposal in New Delhi, but in the Notified Area improvement was effected. A scheme of far-reaching importance for the disposal of refuse from Delhi City came into operation during the year. This scheme involved the transportation of all city refuse by a special refuse train to a dump about five miles north of the city and improvement in the conditions obtaining in the neighbourhood of the old dumps was immediate. Expenditure on this scheme comprised Rs. 4,59,150 for the construction of line quarters and Rs. 8,49,825 for rolling stock which was borne by the Central Government; a recurring expenditure of Rs. 1,11,400 is being borne by the Delhi Municipality.

Rapid progress was made during the year with the construction of modern sewage disposal works for Delhi and New Delhi and there can be no

question that the completion of this up-to-date purification plant will result in great improvement.

The completion of the new extension scheme at Chandrawal Water Works ensures that there will no longer be water shortage during the months when the river is low. This extension scheme has raised the output of filtered water from 10·00 millions to 13·95 million gallons per diem.

A notable advance was made in respect of the housing problem by the formation of the Delhi Improvement Trust whose function is the development of new housing areas and the clearing of existing slums. Good progress was made in schemes for the development of Nazul land and eight extension schemes were in hand.

In the rural areas further repairs to wells were effected by means of the rupees one lakh grant for improvements in rural areas. Considerable progress was made in the disposal of waste water from wells, whilst in some villages improvement was effected in the methods of refuse disposal. Progress was also achieved in the disposal of house sullage by means of soakage pits and in the improvement of house ventilation.

In order to stimulate general interest in village improvements, the Chief Commissioner offered a prize of Rs. 250 to the village which displayed the greatest progress in these matters. Village sanitation also formed one of the subjects of the competition for this award.

United Provinces.

74. Expenditure on health works executed under the Superintending Engineer, Public Health Department, amounted to Rs. 41,09,677, an increase of Rs. 7·4 lakhs. Of this total, a sum of Rs. 10,83,078 was spent on original water works and special repairs, Rs. 19,88,046 on water works maintenance, Rs. 2,97,790 on drainage original works and special repairs, Rs. 3,30,269 on drainage maintenance and Rs. 4,09,694 on other works. Projects to the value of Rs. 40,63,541 were finally sanctioned, others involving an expenditure of Rs. 13,16,237 were submitted but not sanctioned. Projects estimated to cost Rs. 8,87,000 were under preparation and other schemes costing Rs. 3,84,879 were delayed for want of staff.

As usual in nearly every town with a piped water-supply, water analysis was carried out by the medical officer of health in the municipal laboratory, but for control purposes samples of water were also examined chemically and bacteriologically at the Provincial Hygiene Institute during the hot, rainy and cold seasons. The Assistant Director of Public Health, First Range, inspected the water-supplies of Muttra, Brindaban and Hardwar municipalities in connection with the arrangements for the Kumbh Fairs to be held there in 1938. The results of the chemical and bacteriological analyses of municipal water supplies were considered by the Board of Public Health. A note on the incidence of water-borne diseases in various municipalities prepared by the Director of Public Health was also considered and it was found that a piped water-supply was not the only factor influencing the incidence of intestinal diseases, but that other factors such as fly nuisance, overcrowding, drainage, etc., must also be taken into account. Shortage of water in the outlying areas of large towns was a continued cause of complaint. Samples of water from eleven important railway stations and pilgrim centres were examined bacteriologically at the commencement of and during the fairs and at the time of cholera prevalence in the districts. The results

of the analyses carried out by railway medical officers were as usual scrutinized at the Provincial Hygiene Institute and necessary recommendations for the improvement of railway station water-supplies were made.

No improvement was made in respect of drainage conditions in the large towns. Sewage purification in the towns having under-ground sewers was confined to land treatment. Developments included the completion of a major portion of Hardwar drainage scheme for the Kumbh Mela. Outside water-supply and drainage schemes, little progress was made with other public health works such as the provision of hospitals, markets, model lodging houses, dispensaries and town planning.

In the field of rural sanitary improvement, the year was one of intense activity, the provincial Government's programme for rural development having provided a considerable impetus. The programme of health work in the areas selected for rural development consisted of the supply of medicine chests, the construction of manure-pits, soakage-pits, bathing platforms or sheds and latrines, the improvement of cattle sheds, the provision of house ventilators, the training of indigenous *dais*, improvement in the recording of vital statistics and the formation of village sanitary committees.

Government provided a sum of Rs. 35,000 for the improvement of wells and placed a sum of Rs. 27,237 at the disposal of eight district boards on the following conditions :—

- (i) the whole of the grant should be spent on a contributory basis, the contribution being from the district board or any private agency belonging to the rural areas, and being not less than one-fourth of the cost of the construction of the well. In the case of district boards, the contribution must be in cash ; in the case of private agency it may either be in cash or in kind (including labour), *i.e.*, the villagers concerned who are to benefit by the construction of wells may provide material and/or free labour for the construction of the well ;
- (ii) wells should not be constructed out of this grant in hamlets where they already exist or are being constructed out of the substantive allotment for rural development or from other sources ;
- (iii) the site of the wells and the number of wells to be constructed should be decided in consultation with the district rural development association, but not more than one well should be constructed in a village ;
- (iv) the work of construction should be supervised by the district boards' own staff and carried on under the advice of district medical officers of health in districts where there are such officers ;
- (v) the district board should agree to maintain the wells constructed out of this grant in proper condition in future.

Of the Rs. 1,79,431 placed at the disposal of the Board of Public Health, a sum of Rs. 74,492 was spent on special assistance to pilgrim centres ; Rs. 54,581 on urban sanitation ; Rs. 50,158 on rural and minor sanitary works ; and Rs. 200 on other works. The grant for pilgrim centres included Rs. 56,045 for Hardwar municipality drainage scheme and Rs. 7,000 for Brindaban municipality Kumbh Mela water-supply. Improvements in urban sanitation included Rs. 12,275 for Dehra Dun water-supply reorganisation and

extension of the distribution system ; Rs. 10,786 for Gorakhpur municipality drainage extension ; Rs. 9,294 for the construction of a storm water drain in Muttra ; Rs. 8,000 for the conversion of the old Police Hospital building into an infectious disease hospital at Lucknow ; and Rs. 4,500 for the improvement of Ganda Nala in Jhansi. In the rural areas, up to 1936 the grant to each district was given in proportion to the demands received, but in order to secure a more equitable distribution of funds, it was decided by the Provincial Government in 1937 to distribute the grant in proportion to the population and the number of villages in each division. Projects sanctioned by the Board of Public Health included water-works to the value of Rs. 13,43,873 ; drainage and sewerage works Rs. 3,89,413 ; and others Rs. 4,12,623. Loans were sanctioned by Government for works to the value of Rs. 11,74,590.

Bihar.

75. Different minor improvements suggested by A. D. P. H.s during their inspections were carried out in municipal areas but because of financial stringency-it was not possible to undertake larger schemes or major public health projects such as protected water-supply, improved drainage, construction of sanitary markets, opening up of congested areas, etc. In most villages, such elementary requirements as a safe water-supply and a satisfactory method of disposal of night soil are not provided.

The new drainage scheme in Jharia Mines, which was completed in 1935, was maintained in full working order.

Orissa.

76. Puri water-supply was maintained in good order, the average daily supply being 258,000 gallons and there was no indication that pumping from the headworks had adversely affected the sub-soil water from which the supply is drawn. Original works to the value of Rs. 13,867 and repair works to the value of Rs. 38,642, including expenditure on Puri water works, were carried out during the year by the Superintending Engineer, Public Health Circle, Bihar.

In urban areas, most of the minor recommendations made by the Director of Health during his inspection tours were carried out by the municipalities themselves, but larger schemes were postponed for paucity of funds.

As regards rural areas, although some districts were in receipt of Government grants to assist in the maintenance of a health organisation scheme the average district expenditure on sanitation was completely inadequate. The Director of Health has expressed the opinion that it ought to be made obligatory on the part of local authorities to set apart a certain percentage of their annual income for sanitation, and public health works. Improvements were carried out to rural water-supplies in the districts of Cuttack, Puri, Balasore, Sambalpur, Ganjam and Koraput. The only other activity worth mentioning was the construction of bore hole latrines at some of the more important places in Koraput Agency. The Director of Health has reported that conservancy in these areas is in a primitive stage, pigs and dogs being the ordinary scavengers.

Bengal Presidency.

77. The total municipal expenditure on public health works during 1936-37 was Rs. 49,55,394 and constituted 39·4 per cent. of the total income. As compared with the previous year the total expenditure on sanitary works increased by 5·03 per cent. Conservancy, water-supply and drainage formed the main items of expenditure, the amounts spent being approximately Rs. 24,39,000, Rs. 11,87,000 and Rs. 3,68,000 respectively.

In the rural areas a sum of Rs. 9,41,634 was spent on water-supply during 1936-37 or 3·8 per cent. of the total income as against 3·4 per cent. during the previous year. The amounts spent on sanitation and drainage during 1936-37 were approximately Rs. 19,65,000 and Rs. 58,000 or 7·9 per cent. and 0·2 per cent. of the total income.

Central Provinces.

78. The general situation with regard to urban water-supplies showed some slight improvement as compared with the previous year, as the installation of a chlorination plant for Buldana town was taken in hand, a similar plant was installed by the Khamgaon municipal committee and the work of the Kanhan river water works scheme for Nagpur was started. Drainage works generally remained in the same unsatisfactory state as before but the drainage scheme of Riffe Range, Akola, was taken in hand. No progress was made in respect of conservancy, the condition of private latrines or the system of collecting night-soil. Government grants-in-aid to the extent of Rs. 65,416 were paid to municipal committees and private bodies for sanitary works during 1937-38.

The problem of water-supplies for rural areas remained as before and there is almost an entire absence of any form of conservancy in these areas.

The provisions of the Village Sanitation and Public Management Act were in operation in 65 villages and although the total receipts for these villages amounted to Rs. 1,52,674 during the year ending 30th September 1937, only Rs. 6,426 were spent on water-supply and Rs. 3,874 on drainage. Total receipts of Town fund and other villages under the *Mukaddam* Rules amounted to Rs. 16,918, of which Rs. 290 only was spent on water-supply and Rs. 317 on drainage. In the *ryotwari* villages of eight districts a sum of Rs. 7,428 was spent on improvement of water-supply. In Amraoti district, a number of village uplift committees collected funds and utilized the money for disinfection of wells. Sanitation rules under the Land Revenue Code were applied and committees formed at 46 villages. In these local taxes were raised and the money was spent on approved objects such as village sanitation, improvement of water-supply and repairs to fair-weather roads.

Bombay Presidency.

79. Expenditure on public health measures amounted to approximately Rs. 3-12-0 per head of population in Ahmedabad City and averaged about Rs. 2-2-6 for the remaining municipalities. The municipal water-supplies at Ahmedabad, Surat, Kapadwanj, Dhulia, Nandurbar, Bijapur, Hubli, Nasik, Poona and Sholapur were regularly treated and their standard of purity maintained.

Complete sanitary surveys of eight towns were made and 46 towns were the subject of special inspections or reports. In numerous other cases, advice was given in matters of water-supply, conservancy, prevention or spread of disease and in measures of a more general nature and action was taken in many instances on the suggestions made. Ten municipalities constructed and repaired latrines, four constructed urinals, 14 constructed gutters, five constructed surface drains and water-works were constructed in Chopda town. The Nasik system of trenching night-soil was adopted by 12 municipalities; this system has proved a success in all these areas except three, where realisations from sale-proceeds were not adequate to meet the costs.

Government placed at the disposal of the Commissioners of Divisions a sum of Rs. 10,00,000 for improvement of village water-supplies. The amounts allotted were not as before conditional on contributions equal to one-third of the cost of each work from the local boards and villages concerned. Seven hundred and eighty-seven new draw-wells were constructed and 82 step-wells were converted into draw-wells.

The sanitary board at Siddapur in Kanara district constructed a well and did usual conservancy work. One hundred and sixty sanitary committees and 522 village panchayats functioned during the year.

The Board of Public Health Works met twice and accorded approval to the following projects for execution:—

- (1) Surat drainage outfall works;
- (2) Dhulia street drains;
- (3) laying of a further portion of the collecting and gravitation outfall sewer and Sadar Bazar Nala sewer in Sholapur; and
- (4) Khed (Ratnagiri) water-supply.

Sind.

80. Expenditure on public health measures per head of population was approximately Rs. 1-13-10 in Karachi City and averaged Rs. 2-7-1 for the remaining municipalities employing subsidised health staffs.

The water-supplies in Karachi and Sukkur continued to be maintained at a high standard of purity. At Hyderabad the water was sedimented and chlorinated with perchloron; occasional samples were sent to the chemico-bacteriological laboratory for examination. At Jacobabad the water was pumped from wells situated three miles out of the town to a high service tank; the water was permanganated at the source and samples were periodically sent to the laboratory for examination. Only a portion of Rohri town is provided with a piped water-supply; water is pumped into a high tank from the river and permanganated but no sedimentation or filtration is done.

Government placed at the disposal of the Revenue Commissioner for Sind a sum of Rs. 28,000 for the improvement of village water-supplies and 39 draw-wells were newly constructed.

Expenditure of district local boards on public health measures varied from 8 per cent. of total income in Larkana district to 3 per cent. in Dadu district; the average expenditure on public health per head of population varied from Rs. 0-2-2 in Larkana district to Rs. 0-0-8 in Dadu district.

Out of allotments from the Government of India grant of Rs. 1,38,000 for village uplift work, expenditure up to 31st December, 1937, totalled Rs. 87,750. The expenditure was incurred on (1) establishment of seed and

implement depots ; (2) improvement of cottage industries ; and (3) improvements to village water-supplies, sinking of wells and tube-wells, improving and deepening tanks, construction of bathing ghats, levelling of streets and paving bazaars, construction of approach roads to villages, drainage, supply of cess pool carts and laying out of parks.

Madras Presidency.

81. With the completion of the water-supply scheme for Saidapet municipality during the year, a total of 42 municipalities had protected water-supplies. New schemes for seven other municipalities were under execution, extensions or improvements or both to existing water-supply schemes were in progress in 16 municipal towns ; plans and estimates for water-supply schemes in all municipalities were pending sanction with the provincial Government ; the scheme for Srivilliputtur municipality was under preparation ; and investigations of the schemes for Kurnool, Dharapuram and Karur were completed.

As regards rural areas, the water-supply schemes for Arkonam, Tiruvallur, Batlagunda, Manapparai and Karamadai were under execution ; plans and estimates for Mettupalaiyam water-supply scheme were submitted to Government for sanction, whilst investigations of the schemes for Arantangi, Pithapuram and Tiruchanur were in progress.

With the completion of the drainage scheme for Bezwada municipality during the year under review, the total number of towns possessing comprehensive drainage schemes increased to five, but this number forms a very small proportion of the total number of municipalities in the province. Drainage schemes were under execution in 10 other municipalities whilst the plans and estimates for Vizianagram and Trichinopoly were completed during the year and submitted to Government for sanction. Comprehensive drainage schemes for seven municipalities and Madanapalle were under preparation and investigations of the schemes for Dharapuram, Pollachi and Karur were completed.

Assam.

82. The total income of 17 municipal boards and 10 town committees in Assam was Rs. 12,84,175 during 1937, out of which Rs. 5,77,212 or 45·25 per cent. was spent on sanitary works, original and recurring, as compared with 45·10 per cent. in the preceding year. In addition the Public Works Department incurred a total expenditure of Rs. 9,676-2-0 on the maintenance of water-supplies, on drainage and on town improvements.

Taking into consideration the fact that about 97 per cent. of the population of Assam lives in rural areas and that the health and prosperity of the people of these areas is a matter of vital importance, the Director of Public Health has stressed the necessity for local boards paying special attention to the provision of adequate and safe village water-supplies. He has expressed the opinion that, until this is done, there can be no material reduction in the incidence of water-borne diseases.

No meeting of the Public Health Board was held during the year.

SECTION VIII.

LABORATORIES AND MEDICAL RESEARCH.

Central Research Institute, Kasauli.*

83. Colonel J. Taylor, I.M.S., was Director of the Institute except from 7th August to 6th October 1937, when Lieut.-Colonel W. J. Webster, I.M.S., officiated. Other I. M. S. officers who served on the staff were Lieut.-Colonel Webster, Majors Mulligan, Ahuja and Read and Captain Dogra. The Director, as usual, continued to act as Editor of the Indian Journal of Medical Research and Indian Medical Research Memoirs.

The major routine activities of the Institute continued to be the manufacture of vaccines for civil administrations which do not undertake their own production and for the use of the Army throughout India, the preparation of a bi-valent anti-venom serum, for the treatment of persons bitten by the Indian cobra and by Russell's viper, this serum being supplied widely to civil and military hospitals and dispensaries; and the manufacture of biological products of different types used for routine work in diagnosis, etc., in hospitals and medical centres. Prophylactic sera other than anti-venene are not manufactured, but the Institute continued to stock and issue all imported sera, such as antitetanic, antidiphtheritic, etc., required for the army in India.

The largest manufactured products were (a) typhoid-paratyphoid (T. A. B.) vaccine, which is chiefly required for routine inoculation of the personnel of the Army in India, little being used by the civilian population, and (b) cholera vaccine, mainly supplied for civil use to areas in Northern India. There was a slight rise in the amount of T. A. B. vaccine issued, but the demands for cholera vaccine fell considerably in comparison with previous years, the incidence of cholera in the areas supplied being at a low level. The demand for mixed influenza vaccine was considerable, but other prophylactic vaccines were issued on a smaller scale. A steadily increasing demand for anti-venom serum was noticeable. Table VIII (i) gives details of the issues of the principal products in and out of India, during the year. Figures for 1936 have been given for comparison.

* Annual Report of the Central Research Institute, Kasauli, including the Annual Report of the Malaria Survey of India for 1937. Manager of Publications, Civil Lines, Delhi. Price Rs. 3/6 or 5s. 6d.

/ *Abbreviations—*

I. R. F. A.	Indian Research Fund Association.
I. J. M. R.	Indian Journal of Medical Research.
D. P. H.	Diploma in Public Health.
D. P. H. & Hyg.	Diploma in Public Health and Hygiene.
D. M. C. W.	Diploma in Maternity and Child Welfare.
M. R. Deptt.	Medical Research Department.
I. M. G.	Indian Medical Gazette.
S. A. B.	Scientific Advisory Board.

TABLE VIII (i).

Products.	1937.			Total 1936.
	In India.	Out of India.	Total.	
<i>Vaccines.</i>				
Prophylactic cholera .	179,253 c. cs.	62,205 c. cs.	241,458 c. cs.	731,700 c. cs.
Prophylactic mixed typhoid-paratyphoid (T. A. B.).	386,960 c. cs.	5,406 c. cs.	392,366 c. cs.	378,035 c. cs.
Prophylactic mixed influenza.	24,963 c. cs.	1,000 c. cs.	25,963 c. cs.	9,218 c. cs.
Curative . . .	6,697 doses	268 doses	6,965 doses	9,291 doses.
Autogenous . . .	402 doses	..	402 doses	771 doses.
<i>Sera.</i>				
Antivenene (tubes of 10 c. c. concentrated).	7,075 tubes	698 tubes	7,773 tubes	7,170 tubes.
Normal horse (tubes of 20 c. c.).	785 tubes	36 tubes	821 tubes	660 tubes.
High titre (diagnostic) .	892 c. cs.	..	892 c. cs.	779 c. cs.

Routine bacteriological work required for departments of the Government of India was, as usual, carried out at the Institute. This mainly consisted of the examination of disinfectants for the Indian Stores Department. Examinations of pathological material were also undertaken for practitioners and medical institutions not entitled to these services on a scale of fees laid down by Government.

The collection of type cultures of micro-organisms, in which strains of all types ordinarily required are represented, was maintained and a few additions were made during the year both from local sources and from the National Collections. As many as 643 sub-cultures were supplied to authorised persons for clinical and teaching purposes. Large quantities of standard agglutinable suspensions, media, reagents, stains, and special chemical and biological products were also issued to meet the requirements of laboratories, hospitals and others.

No systematic courses were given, but opportunities were, as usual, afforded to a number of medical men to study special methods of technique. Technical advice and assistance was also given on many problems; amongst the subjects on which such help was rendered may be mentioned snake-bite and anti-venene, anti-plague vaccines, epidemiology of plague, T. A. B. vaccines, therapeutic sera, the Zondek-Aschheim test, yellow fever and cholera.

The library of the Institute continued to afford reference facilities to medical research workers.

The Institute has for a number of years maintained an entomological section on a temporary basis. The routine work carried out by this section included (a) the routine identification of insects, chiefly mosquitoes, and as many as 212 collections were examined and reported upon during the year; (b) valuable additions to an unparalleled collection of the Indian species of culicines, anophelines and phlebotomus and (c) the making of valuable permanent preparations for use in research work, for teaching purposes and for future reference.

Research Work.—The research work during the year under review was concentrated on cholera. This work has been described on page 33.

The researches carried out by the entomological section of the Institute included studies on infiltration of *culicine* mosquitoes in Delhi and the bionomics of *A. culicifacies* and *A. stephensi* at Karnal and Delhi respectively.

All-India Institute of Hygiene and Public Health, Calcutta.*

84. Dr. R. B. Lal continued to act as Director. The Institute has dual functions, a training centre for advanced studies in public health and a centre for research. Since 1934, four courses for the Diploma in Public Health have been held. In order to ascertain how far India had made use of the graduates of the Institute and how they were being employed, information was collected from *ex-students* regarding their employment and the nature of their studies. The response shows that about two-thirds of the graduates hold official positions, but less than half are engaged in public health or research work. Most of those in employment are Government servants, whilst local bodies and other authorities who are mainly responsible for the administration of public health, employ only a small number.

As a training centre, the Institute has attracted medical men, both from Government services and from the independent profession. Students came from most of the provinces, but because of the limited accommodation, over half the applications had to be rejected. The demand for admission from women medical graduates, for the diploma course in maternity and child welfare continued to be unsatisfactory. The D. P. H. class consisted of 26 students, and six licentiates were selected for the D. P. H. & Hy. course of the Faculty of Tropical Medicine and Hygiene, Bengal. Three students took up special courses, two in biochemistry and nutrition and one in vital statistics and epidemiology. Two students joined the D. M. C. W. course, but one resigned for private reasons. Twenty-five students passed Part I and 24 Part II of the D. P. H. course; six students passed Part I and four passed Part II of the D. P. H. & Hy. and one student each passed Parts I and II of the D. M. C. W.

A series of special lectures was given to post-graduate students undergoing training in tuberculosis under the auspices of the King George Thanksgiving (Anti-Tuberculosis) Fund; a malaria exhibition was organised for the benefit of the large number of medical men who had assembled in Calcutta in connection with the All-Bengal Provincial Medical Conference and a number of lectures and demonstrations were arranged. The Institute actively co-operated in organising a malaria symposium under the auspices of the National Institute of Sciences of India.

The financial responsibility for the Maternity and Child Welfare Section was taken over by the Government of India from the beginning of the financial year 1937-38. One student, who was deputed from the Women's Medical Service training reserve, took the maternity and child welfare course during 1936-37 and obtained the diploma.

*Annual Report of the All-India Institute of Hygiene and Public Health, Calcutta, for 1937. Obtainable free of cost from the Director, All-India Institute of Hygiene and Public Health, Calcutta.

A nursery school is attached to the maternity and child welfare clinic belonging to the Institute; admission is confined to children between the ages of two and five years. A specially trained member of the staff teaches the children healthy habits, discipline and sociability, whilst games are arranged for the development of their minds and bodies. Through the activities of the clinic and by means of special lectures and instructions in mothercraft, the centre helped to create health consciousness amongst the mothers.

The opening of the sanitary engineering section in the Institute was sanctioned and steps were being taken to appoint the necessary staff.

The museum at the Institute was wholly reorganised, many new exhibits being added and some old ones replaced. The museum is of considerable help not only to the Institute's students, but most of the Bengal medical schools in and outside Calcutta arrange demonstrations there for their students.

Medical researches carried out during the year included problems (1) relating to cholera, (2) epidemic dropsy, (3) blackwater fever and malaria, (4) maternity and child welfare, (5) nutrition and (6) tuberculosis. Brief notes on these studies are given below :—

Cholera.—These researches are described on page 34.

Epidemic dropsy.—The researches carried out at the Hygiene Institute during previous years produced evidence supporting the view that the causative factor was some deleterious substance ingested through food cooked in mustard oil. The search for this toxic substance was vigorously continued.

Blackwater fever and malaria.—The aetiology of blackwater fever in man and of haemoglobinuria in monkeys has been under investigation for the past few years. The mechanism of haemolysis appears to be the same in both cases and certain changes taking place in the blood and tissues are similar. These include "focal necrosis of the liver, degeneration of the adrenal cortex specially of the *zona fasciculata*, an excessive production of unsaturated fatty acids, a lowering of free cholesterol and a hypo-function of the reticulo-endothelial system". Treatment of monkeys with glucose, ascorbic acid and cortin gave fairly satisfactory results and the same treatment, when applied to seven human cases of blackwater fever, resulted in 100 per cent. recovery. In this connection, it is of interest to note that investigations carried out in respect of the rôle of vitamin C in malaria have shown that, during the malarial paroxysm, the body excretes vitamin C in large quantities and that chronic cases of malaria show a condition of subclinical avitaminosis. These researches have an important bearing on the treatment of malaria and on the prevention of relapse.

A. culicifacies is an important vector of malaria in certain parts of India and the inability of this species to establish itself in Bengal villages and play a part in transmission was under investigation. The studies appear to suggest that temperature and humidity conditions and the chemical composition of the water of breeding places were responsible.

Other studies included the rôle of anti-bodies in kala-azar, the causes underlying periodic epidemic prevalence of malaria and the relative incidence and intensity of malaria in people of low and high economic status. In regard to the last, the conclusion reached was that, under identical conditions, people of low and high economic status suffered equally from the disease.

Maternity and Child Welfare.—A child welfare centre has been working for the past five years in association with the Hygiene Institute and its records throw interesting light on several aspects of maternal and child life. Among 308 children between the first and third years of life, the incidence of rickets was 24 per cent. among Hindus and 11 per cent. among Mohammedans. Classifying Hindus by provinces of origin, the highest incidence was among Gujratis (35 per cent.) and Marwaris (30 per cent.), whilst among Bengali Hindus it was 10 per cent. An investigation into the diets and habits of the mothers and children of different communities would be interesting.

Investigation of the obstetrical histories of 414 multiparae showed that 1,615 pregnancies had resulted in the birth of 1,372 living children, 71 stillbirths and 173 abortions. Whilst these figures relate to un-completed families and therefore cannot be used for calculating the average female fertility rate during her reproductive period, they give a still-birth rate of 51.75 and an abortion rate of 126 per thousand live births, which are valuable figures in view of the general lack of reliable information on these matters.

A statistical inquiry into the causes of maternal mortality in Calcutta was carried out over a period of 12 months. The results showed that puerperal sepsis, toxæmias of pregnancy and anaemia were the most important causes of death. In view of the importance of determining the types of pregnancy anaemia prevalent in Calcutta, a special inquiry was commenced and moderately and severely anaemic women attending welfare centres, maternity homes and antenatal clinics of Calcutta are being investigated. A control series of healthy women is also being examined in order to determine the normal range of absolute value for indices such as mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration.

Nutrition.—The research work carried out during the year included diet and physique surveys in four types of community in different parts of India and laboratory work on nutrition problems. The surveys were conducted among (1) industrial workers in Assam, (2) middle-class agriculturists in Bengal, (3) well-to-do Calcutta households and (4) a mixed middle class community in Ferozpur, Punjab. These have given valuable data of the nutritional state of different communities.

Along with the diet surveys, children were examined for height, weight, arm, chest and hip measurements for the purpose of evolving an objective measure of nutrition. Clinical signs of diet deficiency were also noted.

Laboratory researches included (1) estimation of the flavine content of 90 Indian foodstuffs and the B₆ vitamin content of 30 others; (2) biochemical changes in the blood in anaemia; (3) estimation of the allyl-isothiocyanate content of certain samples of mustard oil in connection with incidence of epidemic dropsy; (4) basal metabolism of Indian boys; (5) experimental production of cataract; and (6) excretion of vitamin B₁ in human urine.

Tuberculosis.—The tuberculosis inquiry at the Institute was engaged on (1) a study of tuberculosis in relation to industry in a large jute mill with a population of over 5,000 workers, (2) a survey of tuberculosis incidence in home contacts; and (3) an inquiry into the degree of tuberculisation among hill tribes near Kalimpong. For details of these investigations reference may be made to the report of the Institute.

Central Drugs Control Laboratory.

85. The circumstances leading up to the establishment of a Central Drugs Control Laboratory at Calcutta in March 1937, were mentioned in the report

for 1935. The full complement of staff for the institution was appointed and a comprehensive survey of drugs all over India has been in progress for some time. The results obtained will, it is hoped, be published shortly.

The Government of Bengal realizing the importance of drug control in that province also sanctioned a small unit of three workers comprising a pharmacologist, a bacteriologist and a chemist who will be trained in standardisation work and in the assay of therapeutic substances and medicinal preparations.

School of Tropical Medicine, Calcutta.*

86. Bt.-Col. R. N. Chopra, I.M.S., officiated as Director, except for a leave period of four months when Dr. C. Strickland officiated in addition to his own duties.

The school continued to function as a centre for post-graduate teaching and medical research.

The researches carried out during the year were financed mainly by the endowment fund of the school and by the Indian Research Fund Association, whilst an inquiry into Indian medicinal plants and poisonous plants was supported by a grant from the Imperial Council of Agricultural Research.

Department of Tropical Medicine.—Investigations were carried out on leukaemia and its treatment by deep X-ray therapy; although good immediate results were obtained permanent cure is still not in sight. Torantil, a histamine-detoxifying substance, was tried in the treatment of epidemic dropsy and appeared to have some effect in reducing oedema. A large series of gastric analyses were done in the hospital and it was shown that, contrary to previous belief, acidity of the juice was reduced on account of the predominant carbohydrate diet, the acid secretion in the Indian being very much on the same level as in the European. The quantitative Van den Berg's test was done in a large number of patients suffering from different diseases. "Solustibosan" was used extensively in the treatment of kala-azar with satisfactory results; and sternum puncture was shown to be as efficacious as spleen puncture in the diagnosis of kala-azar.

Department of Protozoology.—Work was continued on monkey malaria. Another species of monkey plasmodium, *P. inui*, was successfully inoculated into man. A number of cases of nervous parasyphilitic condition was treated by infection with *Plasmodium knowlesi*, which parasite as a rule produced a mild infection and seemed quite suitable for the treatment of aged and debilitated individuals. As previous infection with human malaria produced a marked degree of tolerance to infection with *Plasmodium knowlesi*, it did not appear suitable for therapeutic purposes in localities where malaria was prevalent. It was also observed that tolerance to further infection with the same strain of *P. knowlesi* in a *rhesus* monkey can be developed by repeated inoculations combined with inadequate treatment. Experimental rat-bite disease was studied in man and laboratory animals from different standpoints, and a spirillum morphologically indistinguishable from *Spirillum minus* was found in naturally infected guinea-pigs. This finding is considered to be of great importance, in as much as guinea-pigs are no longer considered suitable for diagnostic inoculation in the case of rat-bite disease. Work on leptospiral infection was continued.

*Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases for 1937. Obtainable from the Director, School of Tropical Medicine, Calcutta. (Gratis.)

Department of Bacteriology and Pathology.—Work on the incidence of *Clostridium tetani* in the soil of Calcutta was carried out, no less than 77 per cent. of the samples examined contained toxigenic strains of *Clostridium tetani*. The hydrogen-ion-concentration of a large number of specimens of human faeces was studied; and the testing of therapeutic sera and prophylactic vaccines was done in a large number of samples.

The cholera researches carried out in this department are described on page 34.

Department of Entomology.—Studies were carried out on the natural formation of the Bengal delta and its modification by man in relation to malaria and the development of the parasite in the mosquito under natural conditions, as distinct from those of the laboratory. In a malaria control experiment on a tea estate near Kurseong, a reduction in incidence was shown from about 750 cases to 30 cases per annum merely by covering mosquito-breeding places with jungle growth.

Department of Pharmacology.—Investigations into the pharmacological action of snake venoms were continued and their practical application in therapeutics for relief of pain in case of cobra venom and increasing the coagulability of blood in case of Russell's viper venom gave satisfactory results. Detailed studies of the pharmacological action of the individual alkaloids of *Holarrhena antidysenterica* and *Rauwolfia serpentina* were being carried out. Chemo-therapeutic studies with monkey malaria and anti-malarial and anti-dysenteric remedies were continued and a method of accurate estimation of atebirin in the tissues was worked out.

Department of Chemistry.—The chemical investigation of a number of medicinal plants was completed; some preliminary work dealing with the constituents isolated from the roots of *Paris polyphylla* was done; a new method for the isolation and purification in a very pure condition of the glucoside, thevetin, from the seed kernels of *Thevetia neriifolia* was worked out; and the presence of two enzymes, a proteolytic and a lipolytic one, from the fresh seeds of *Butea frondosa* was established and their action studied in detail.

Department of Public Health Laboratory Practice.—Work on the biochemical reactions of lactose-fermenting organisms isolated from human faeces was continued and the value of the four-fold test consisting of the indol, methyl-red, Voges-Proskauer and Koser's citrate utilisation reactions, as compared to that of Eijkman's, was specially studied.

Anaemia and respiratory disease research department.—Research work on anaemia was carried out on much the same lines as last year. Sternum puncture was done on normal volunteers and the normal picture in Indians was worked out. The work on pregnancy anaemia amongst women labourers on tea estates was continued. Further normal groups were investigated haematologically and it was found that amongst healthy Indian women in Calcutta the blood picture did not differ materially from that of normal women in Europe and America. A number of cases of leukaemia was also investigated.

Department of Helminthology.—The results of four more years' work with tetrachlorethylene as an anthelmintic were published and the cure-rate for hookworm infection of about 60 per cent. by means of a single treatment was confirmed. The drug was also found to be as good as carbon tetrachloride for removing tapeworms and it appeared to be an efficient remedy for enterobius. A case of human gnathostomiasis was seen during the year, and as previous

attempts to work out the life cycle of this worm through cyclops and fish were unsuccessful a fresh species of fish was tried, in which development was immediately obtained; this confirms work recently reported from Siam and the Phillippine Islands.

Department of Dermatology and Medical Mycology.—Experimental work was done in connection with the action of fungicidal drugs and their application in therapeutics.

Diabetes.—The average normal "fasting" level of the inorganic phosphate content of blood in healthy Indian subjects was found to vary between three and five mgms. per 100 c. c., the range of variation being the same as in European countries. The study of the inorganic phosphate content of the blood in its relationship to carbohydrate metabolism was also taken up. In pursuance of the conclusion reached last year that the degree of hypercholesteræmia was a more satisfactory index of the severity of the diabetic condition than the state of hyperglycaemia, a new method of classification of cases of diabetes was adopted, depending on the degree of hypercholesteræmia present (irrespective of hyperglycaemia). This new method of grouping of the diabetic cases gave the interesting finding that the severity of the diabetic condition and the complications present were found to vary directly according to the degree of hypercholesteræmia and not the content of blood sugar.

For the work done on leprosy reference may be made to section II (pages 61—70).

Investigations were carried out on leptospiral jaundice (Weil's disease) in India and the etiology of epidemic dropsy from a bacteriological view point.

Haffkine Institute.*

87. Lieut.-Col. S. S. Sokhey, I.M.S., was Director of the Institute during the whole period; Lieut.-Col. R. C. Wats, I.M.S. and Dr. P. M. Wagle were Assistant Directors.

As usual, the resources of the Institute were almost entirely devoted to the routine production of large quantities of prophylactic vaccines. Haffkine's plague vaccine is produced in large quantities and cholera, typhoid and anti-rabic vaccines are prepared for use in the province of Bombay. In addition, the Institute functioned as the provincial bacteriological laboratory for Bombay Presidency and did diagnostic work for Government hospitals.

The demand for the plague vaccine continued to be large. Altogether, 1,324,337 doses comprising 3,973,011 c. c. of plague vaccine, 640,978 doses of cholera vaccine, 10,779 doses of meningococcal vaccine and 9,325 doses of typhoid vaccine were issued. Meningococcal vaccine has been issued during the last few years purely as an experimental measure in the hope that it would be possible to collect data which would throw some light on its value but unfortunately no useful data has been collected.

Important investigations in plague and pharmacological studies of synthetic anti-malarials were conducted with the aid of grants from the Indian Research Fund Association. A short resumé of these researches has been set out in the second part of this section of the report.

* Report of the Haffkine Institute for the year 1937. Obtainable from the Superintendent, Government Printing and Stationery, Bombay. Price As. 3 or 4d.

Anti-plague serum.—Production of the serum on lines similar to those of previous years continued, but no opportunity arose for field tests. Early in 1938, however, a small epidemic occurred at Bettiah in Bihar and 124 cases were dealt with. Cases treated with serum gave a percentage mortality of 27·54 and the controls one of 65·45. Patients were on admission taken alternately for serum treatment and as controls.

Pharmacology Department.—This department, entirely maintained by the I. R. F. A., is engaged primarily in researches on synthetic anti-malarials.

Biochemical researches.—Work continued on the establishment of normal clinical standards for Indians, 121 men and 101 women between the ages of 18 and 30 years being examined. Haemoglobin determinations were made by the Van Slyke oxygen capacity method, which yields very accurate results. Averages of 15·37 g. of haemoglobin per 100 c. c. of blood for men and 12·99 g. for women were obtained. Contrary to expectation, these figures tallied exactly with similar haemoglobin averages worked out in America for American subjects, in spite of the dissimilar dietetic and climatic conditions. This points to the possibility of there being a physiological constant for haemoglobin. The subject was being studied further.

Public health chemistry and bacteriology.—Over 9,000 specimens sent by hospitals and dispensaries were dealt with and over 5,000 Wassermann and Kahn tests were carried out. Proposals were submitted to Government suggesting the opening of the services of this section of the institute to a wider public.

Training of health personnel.—Nine epidemic medical officers were given a course of training in rat dissection for detection of plague lesions; a special officer of Bombay Health Department was given a course of training in plague preventive measures, including fumigation with calcium cyanide compounds; a short course of demonstrations and lectures on the subject of rat examination and rat and flea destruction was given to sanitary inspectors; demonstrations of the methods of rat examination and rat destruction were given to members of the post-graduate class in tuberculosis as also to certain women students attending the Bombay Health Visitors Class.

King Institute of Preventive Medicine, Guindy.*

88. Lieut.-Col. H. E. Shortt, I.M.S., was Director of the institute during the year under report except from 1st October to 8th November 1936 when Dr. C. G. Pandit officiated.

Vaccine lymph.—During the year, 19,808 grammes of crude lymph were manufactured; the lymph was issued in a dilution of 1 in 5 throughout the year and total issues amounted to 84,198 c. cs. Details regarding vaccine lymph and vaccinations will be found in Section VI.

Bacterial vaccines.—The issues of cholera vaccine increased by more than 320,000 c. cs. as compared with the previous year, and the total exceeded all previous institute record. The issue of T. A. B. vaccine also increased by nearly 19,000 c. cs.; this is said to be due to the fact that municipalities and schools took advantage of concessional rates allowed under provincial Government orders. There was a fall in demand for *Staphylococcus pyogenes* vaccine, but an increase in that for streptococcus, filarial and typhoid curative vaccines; altogether 58,258 doses of various therapeutic vaccines were issued.

* Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September 1937. Superintendent, Government Press, Madras. Price 8 annas.

A total of 3,202 doses of autogenous vaccines, 6,340 c. cs. of cholera bacteriophage and 8,322 c. cs. of dysentery bacteriophage were issued. There was a further increase in the supply of various sera from 88,034 doses in 1935-36 to 96,066 during 1936-37.

Bacteriological, serological and chemical examinations.—A total of 14,194 clinical bacteriological specimens was examined, the increase being mainly under “faeces for cholera”.

The serological work at the Institute has steadily increased and during the year under review 56,707 tests were done, as against 55,164 during the previous year. A new feature was the introduction of an apparatus devised for use in the Kahn test which facilitated the work involved.

The work of the Public Health Section, which is concerned with analysis of water samples has more than doubled during the last ten years. As many as 8,653 samples of water were examined from all sources, this figure being more than 2,300 higher than that for last year. The samples derived from protected water-supplies, which are systematically examined three times a year, numbered 1,845. Of the remaining 6,808 samples, about 2,000 were examined in connection with the enquiry into the occurrence of “endemic fluorosis” in some of the Ceded Districts, whilst the others came from experimental installations and from rural and urban water-supply investigations and schemes.

Special investigations.—The “investigation units” of the Institute carried out a number of investigations which included an enquiry into the cause of the phenomenal increase of organic matter in the Pambar Lake water; examination of water-supply sources at Podili and adjoining taluks in the Nellore district with particular reference to the presence of fluorides; a survey in connection with the temple tank at Conjeeveram accompanied by field tests; a survey of the water-supplies, both protected and unprotected, with reference to the presence of fluorides and of the dental condition in school children; an outbreak of stomatitis in the Central jail at Trichinopoly; an investigation of an epidemic of enteric fever at the Christian College, Tambaram; and a cholera carrier study at Madura.

Research work.—Research was assisted by officers of the Medical Research Department of the Government of India who were paid by the Indian Research Fund Association. Details of these will be found in the second part of this section which deals with I. R. F. A. activities. In addition, Dr. Paul F. Russell of the Rockefeller Foundation continued to work on malaria at the institute. The basic purpose of his studies was investigation of the possibilities of controlling rural malaria in South India at a cost commensurate with available funds.

King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong.*

89. Lieut.-Col. L. A. P. Anderson, I.M.S., continued to be Director throughout the year.

Details concerning the anti-rabic section are given in the later paragraph dealing with anti-rabic treatment and pasteur institutes.

* King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong—The 21st Annual Report for 1937. Assam Government Press, Shillong.

Following the recommendations of the cholera advisory committee of the Indian Research Fund Association, the field unit at Habiganj was closed down and the work of the cholera inquiry was chiefly directed to basic laboratory research. Investigations undertaken during the year included (1) transformation of the agglutinable cholera vibrio to the inagglutinable vibrio; (2) inhibition of phage by vibrio extracts; (3) the incidence and characters of vibrios in natural water sources; (4) examination of stools; (5) biochemical and other reactions of the group of non-fermenting vibrios; and (6) papain-casein medium. In all experiments relating to the transformation of the agglutinable cholera vibrio to the inagglutinable vibrio, several biochemical types of vibrios were isolated from each water sample before the addition of the agglutinable vibrio, but it could not be said that transformation of the agglutinable vibrio had taken place in any particular direction, unless in each instance it has changed into the very type or types of inagglutinable vibrios which were already present in the samples. The duration of life of the agglutinable vibrio as such was short, the maximum period of life being seven days. Studies on the incidence and characters of vibrios in natural water sources showed that vibrios were almost universally present in natural water sources and in no instance was an agglutinable vibrio isolated from any of the sources examined.

Vaccine Section.—The total quantities of vaccines issued during the year comprised cholera vaccine 425,443 c. cs., T. A. B. vaccine 7,316 c. cs. and influenza vaccine 15,060 c. cs.

Bacteriophage Section.—Total issues of bacteriophage amounted to 401,884 doses. This figure was less by 587,436 doses as compared with 1936, the difference being due to the discontinuance of the free supply of bacteriophage to the experimental areas of Nowgong and Habiganj.

Assam Medical Research Society.—The work of this society has been reviewed in a later paragraph relating to researches under the I. R. F. A. Experiments on the efficacy of "Pyrocid 20" as an insecticide were carried out by using it in kerosene in dilutions of 1-40, 1-35, 1-30, 1-25 and 1-20 in rooms of 1,500 cubic feet capacity, three quarters of an ounce of the dilution being used in each experiment. Five experiments were made with each dilution, 100 adult anophelines (*A. maculatus* and *A. annularis*) being liberated prior to spraying with the diluted disinsecticide. The results were tabulated after 20 minutes' exposure to the vapour, in terms of numbers of anophelines dead and numbers stupefied. In order to determine whether those stupefied would recover, they were examined again after 24 hours when, without exception, they were found to have died. The table below gives the average results for five experiments with each dilution:—

TABLE VIII (ii).

Dilution.	Number of anophelines exposed.	Average No. per 100 dead in 20 minutes.	Average No. per 100 stupefied in 20 minutes.	Per cent. of efficacy.
1-40	100 × 5	36	43	79
1-35	100 × 5	50	37	87
1-30	100 × 5	56	37	93
1-25	100 × 5	55	38	93
1-20	100 × 5	58	37	95

INDIAN RESEARCH FUND ASSOCIATION.

90. The following is a brief summary of the investigations financed during 1937. Full details will be found in the technical report of the S. A. B. in papers published in the I. J. M. R. and its Memoirs, in the Journal of the Malaria Institute of India, the Indian Medical Gazette and other journals. A detailed list is given in the appendix to this section (page 306).

Cholera.

91. For all researches on cholera reference may be made to page 33.

Malaria.

92. (i) *Malaria Institute of India, Kasauli.*—(a) *Classes and instructional work.*—The annual malaria class held at Karnal was attended by 21 students, of whom 16 passed the examination. A special course on malaria control measures for sanitary inspectors was also held at Karnal and was attended by five students.

The Journal of the Malaria Institute of India and the malaria Bulletins which were issued occupied a large part of the time of the staff.

(b) *Routine entomological work.*—Expert identifications were made of 212 collections of mosquitoes containing 1,902 anopheline adults, 139 anopheline larvae, 444 culicines, 17 phlebotomus and 42 other insects.

(c) Mounted and living mosquitoes, strains of monkey malaria, specimens of *gambusia*, specially prepared glass capsules, normal monkeys, etc., were sent to numerous workers throughout India. In addition, pathological and parasitological material was supplied for use in the 4th International Course in Malariology at Singapore.

(d) In addition to the conduct and supervision of an intensive anti-malarial campaign in Delhi and the initiation of a number of permanent anti-malarial works, temporary control measures were carried out on a large scale.

(e) A large scale experiment on the bionomics of *A. culicifacies* was undertaken. This experiment was designed to obtain information regarding the longevity, dispersion and habits of this important species. A study of the epidemiology of malaria in Kutch was carried out, results of which added considerably to knowledge of *A. culicifacies* and *A. stephensi* in relation to the transmission of malaria in India. A preliminary investigation has shown that none of the chemical factors individually or collectively has any effect on the breeding of *A. stephensi* in the wells in Delhi.

(ii) *Malaria transmission enquiry under the Director, School of Tropical Medicine, Calcutta.*—These researches have been briefly described on page 179.

(iii) *Blackwater fever by Dr. K. V. Krishnan at the All-India Institute of Hygiene and Public Health, Calcutta.*—This inquiry has been described on page 177.

(iv) *Investigation into the maxillar index of A. stephensi in Calcutta.*—Sufficient material to work out the maxillary index of *A. stephensi* has not yet been collected. Observations so far made indicated that adults of this species were as easily obtainable in November as at other times of the year. Recent work has suggested that at least two different races of *A. stephensi* exist in India. If this is confirmed, it will be necessary to repeat a considerable part of the work already carried out.

(v) *Assam Medical Research Society*.—The work of this society comprised (a) a course of training in malariology to qualified medical practitioners; (b) malaria surveys; (c) experiments to evaluate the use of plasmoquine; (d) malaria control experiments, two groups of villages being selected for cold weather and pre-monsoon antilarval control; and experiments with Pyroicide '20' as an insecticide.

Nutrition.

93. (i) *Nutrition research under Dr. W. R. Aykroyd, Nutritional Research Laboratories, Coonoor*.—The activities included (1) surveys of diet and state of nutrition; (2) collection of food production data; (3) experiments on the value of milk as a supplement to Indian dietaries; (4) study of sources of vitamin A and carotene; (5) basal metabolism studies; (6) study of the nutritive value of soya bean; (7) work on the biological value of proteins; (8) survey of deficiency diseases; and (9) education and propaganda. Further remarks on nutrition work in India will be found on page 236.

(ii) *Investigations on Indian foods as regards their vitamin B₂ complex by Dr. H. Ellis C. Wilson at the All-India Institute of Hygiene and Public Health, Calcutta*.—These researches are described on page 178.

(iii) *Enquiry on cheap well balanced diets under the Bombay Presidency Baby and Health Week Association*.—This investigation was pursued by the carrying out of feeding experiments on (1) children and (2) albino rats.

(iv) *Investigation on basal metabolism in children and adults in the Bombay Presidency under the Dean, Seth G. S. Medical College, Bombay*.—Experiments for finding the standards for basal metabolism in normal Indian men and women were started late in the year and no definite conclusions were reached.

(v) *Ascorbic acid enquiry by Dr. B. C. Guha, University College of Science and Technology, Calcutta*.—Attention was focussed on the estimation of (1) ascorbic acid in foodstuffs, and (2) ascorbic acid oxidase in plant and animal tissues; (3) the effect of ascorbic acid on certain toxins and (4) the effect of vitamin C on the growth of certain micro-organisms.

(vi) *Inquiry by Dr. K. P. Basu, Dacca University, in respect of differential retention of protein, phosphorus, calcium, etc., on rice and wheat diets*.—The subject of the experiment was a young man of 18 years weighing 49 kilograms. He was in nitrogen balance with 0.06 gm. nitrogen per day per gm. body weight, whilst with a wheat diet he required 0.08 gm. per day. Those who are on a rice diet apparently require only a smaller amount of protein. On the other hand, on rice diet the subject was in negative calcium balance, whilst on wheat diet calcium balance was always positive. This suggests the desirability of replacing a portion of the rice diets of rice-eating people with wheat. Rice is not only poor in calcium, but its calcium is also insufficiently utilised by the body. The intake and outflow (urinary and faecal) of phosphorus increased with increasing levels of consumption of rice and wheat and there was also an increasing positive balance of phosphorus.

(vii) *Enquiry into the etiology and pathology of peptic ulcer in South India under Dr. Ian M. Orr*.—Investigations were carried out in Travancore and in the Deccan and included a study of the diets of the people, a follow-up of cases of gastro-enterostomy and gastrectomy, fractional test meals, and histological studies on sections of tissue removed from the seat of ulcers in human stomachs during operation. A comparison of the various centres in which these studies were carried out showed that, as one moved northward, the diet became more balanced, the proportion of protein to carbohydrate becoming greater and vitamins A and B being better represented. At the same

time chronic gastritis decreased, the tendency to pylorospasm and antral-spasm became less and the incidence of peptic ulcer fell to a remarkable extent. Incidence of ulcer appeared therefore to be proportionate to dysfunction in gastric motility. The cause of this dysfunction was being actively investigated.

Leprosy and Plague.

94. Researches on leprosy and plague have been dealt with on pages 61 and 39.

Vaccines.

95. *Anti-rabic vaccine enquiry under the Director, Pasteur Institute of India, Kasauli.*—The scheme for decentralising anti-rabic treatment by the distribution of the vaccine to various medical institutions, which has been in progress for some time, was completed during the year.

Experiments were carried out (a) to test the value of immune serum in anti-rabic treatment, (b) in connection with the anti-genic properties of carbolized five per cent. vaccine, (c) in regard to immunity against rabies, (d) connected with the presence, if any, of rabies fixed virus in hyperimmunized sheep, and (e) relating to the anti-genic value of monkey brain anti-rabic vaccine.

Tuberculosis.

96. *Tuberculosis enquiry under Dr. A. C. Ukil at the All-India Institute of Hygiene and Public Health, Calcutta.*—Tuberculosis in relation to industry was studied in a large jute mill, with a labour population of 10,000, situated in a rural area about 22 miles from Calcutta. Another line of study related to the contacts of tuberculous patients, particularly children. This investigation brought out the fact that tuberculosis constitutes a cause of sickness and mortality among children to an extent hitherto unsuspected. The enquiry relating to the incidence of infection among hill tribes near Kalimpong in Darjeeling district revealed that the disease was spreading fairly quickly among these primitive people.

Indigenous drugs.

97. (i) *Indigenous drugs enquiry under Col. R. N. Chopra at the Calcutta School of Tropical Medicine.*—*Chemotherapeutic studies.*—Investigations into the chemotherapeutic effects of different synthetic anti-malarial drugs on Indian strains of the parasite were carried out. It was shown that atebrin had a direct action on *P. knowlesi*. Variation in the effectiveness of different anti-malarial drugs and in the resistance of certain strains of the parasite have been shown to be due to variability in the absorption and excretion of these drugs.

Studies were continued on the value of different amoebicidal drugs. Contrary to previous statements, yatren was found to possess well marked amoebicidal properties in respect of Indian strains of *E. histolytica*.

Investigations on the following drugs used in indigenous medicine were carried out during the year under report :—

- (a) *Rauwolfia serpentina*; (b) *Skimmia laureola*; (c) *Thevetia nerifolia*; (d) *Paris polyphylla*; (e) *Erythroxylon monogynum*; (f) *Rhododendron campanulatum*; and (g) *Barringtonia acutangula*. Other Indian indigenous inorganic preparations examined during the year were: (1) *Raupya bhasma*, (2) *Swarna bhasma* and (3) *Gold kush*.

(ii) *Indigenous drugs enquiry under Dr. Khem Singh Grewal at the K. E. Medical College, Lahore.*—The drugs studied during the year included *Nilumbium speciosum* and *Luffa acutangula*.

Maternal mortality.

98. (i) *Urban statistical enquiry into maternal mortality and morbidity in child-birth in India under Dr. Neal Edwards at the All-India Institute of Hygiene and Public Health, Calcutta.*—This inquiry was carried out during a period of one year from June 1936, to June 1937. Seven hundred and one deaths due directly to childbearing were investigated and of them nearly 32 per cent. were due to puerperal sepsis, 24 per cent. to anaemia *per se* and 20 per cent. to toxæmias of pregnancy, these three being the most important causes of maternal death. The importance of anaemia was even greater these figures indicate, because, in addition many of the fatal cases specially in the sepsis group, presented anaemia as a contributing factor.

An attempt was made to assess the avoidable factor in this series of maternal deaths and although the standards adopted were much below western standards, 96·3 per cent. of the deaths were shown to be associated with the presence of one or more avoidable factors.

Among associated diseases, pulmonary tuberculosis was the most important.

(ii) *Urban statistical enquiry into maternal mortality and morbidity in child birth in India in Bombay under Dr. J. Jhirad of the Cama Hospital.*—A similar inquiry was commenced in Bombay in July 1937, so that the figures available relate to only the first five months. This inquiry also showed that puerperal sepsis, anaemia and toxæmias of pregnancy were the most important causes of death, the percentages being approximately 35, 18 and 16 respectively. It was shown that a primary avoidable factor was associated with about 69 per cent. of the maternal deaths investigated. In regard to associated diseases tuberculosis was again prominent.

(iii) *Researches into the causes of anaemia and eclampsia in Calcutta by Dr. Neal Edwards at the All-India Institute of Hygiene and Public Health, Calcutta.*—This maternal mortality enquiry which was completed in Calcutta during the year under report, brought out the fact that anaemia associated with pregnancy and eclampsia are important causes of mortality. An investigation into the factors responsible for the anaemia of pregnant women was started in July 1937. No work on eclampsia was undertaken.

(iv) *Rural statistical enquiry under the Director of Public Health, Bihar.*—This enquiry started only in October 1937, so that it was too early to report results.

(v) *Enquiry into anaemia of women under Dr. L. E. Napier at the School of Tropical Medicine, Calcutta.*—Anaemia amongst pregnant labouring women was quite different from that of the general working women. The majority were of the microcytic type whilst a macrocytic group also existed. The latter was divided into two sub-groups, one in which the haemoglobin level was only just below the level found in the general female population, but the cells were larger and they were heavily haemoglobinised, and a second sub-group in which anaemia was grave. Pregnancy *per se* and chronic malaria, it was suggested, might be factors in the production of this macrocytic type.

A superficial analysis of the records of treatment of sixty cases of anaemia in pregnancy showed that response to iron treatment was delayed in many cases. A simultaneous dietetic survey in the same population showed a marked deficiency of protein, especially animal protein, of fat, of vitamin A, calcium and possibly of iron. Calcium may perhaps play a part in the utilisation of iron and the requirements of pregnant women in respect of these two salts are great.

Miscellaneous.

99. (i) *Helminthological enquiry under Dr. P. A. Maplestone at the Calcutta School of Tropical Medicine.*—The work of this enquiry included (a) study of the connection between *C. cellulosae* in human beings and *T. solium*, (b) testing the validity of the suggestions that some infections might be due to *C. ovis* and (c) investigation into hookworm treatment. Work on the preparation of helminth-antigens by different methods was also carried out.

(ii) *Enquiry into medical mycology under Dr. P. A. Maplestone at the School of Tropical Medicine, Calcutta.*—The investigations of this enquiry included (1) laboratory testing of the value of certain fungicides, (2) preparation of a trichophytin from local strains of *T. cruris* for testing by skin reactions whether there be any aetiological relationship between ringworm of the feet and secondary cheilopompholyx of the hands from which fungi cannot be isolated and (3) a continuation of previous studies of the suspected virus of skin diseases by cultivation on egg medium through an improved technique.

(iii) *Dracontiasis and filariasis enquiry under Dr. Sundar Rao at the Calcutta School of Tropical Medicine.*—Experiments to test serologically whether immunity, even of a temporary nature, exists in guineaworm infection were carried out, because cases of recurring reinfection are not uncommon. Investigations on double-tailed embryos mentioned previously were also in progress. A survey of cyclops in endemic and non-endemic areas was continued and a large number of cyclops from Bombay and Assam were identified. The successive stages of development of guineaworm embryo in cyclops were investigated experimentally.

In connection with studies on the periodicity of *Microfilaria bancrofti* attempts were made to find out the effect of vaso-dilators such as praziquantel and padutin. These drugs did not produce any deviation in the normal periodicity. The effect of monkey malaria and human malaria (B. T.) on filarial infection was also studied. These infections did not produce any appreciable reduction of microfilariae. Several new drugs were also tried on cases of filarial infection but none had any effect.

(iv) *Protozoal parasites enquiry under Lt.-Col. H. E. Shortt, I.M.S., Director, King Institute, Madras.*—The work included (a) transmission experiments with *Babesia Gibsoni*; (b) development of *B. Gibsoni* in the tick; (c) studies on the haemogregarine parasite of the lizard calots; (d) studies on immunity in protozoal diseases; (e) treatment of malaria in monkeys by an acridine anti-malarial drug; (f) experiments in the transmission of kala-azar through the nasal secretion of patients.

(v) *Survey of cancer in India by Dr. Vishwa Nath at the King Edward Medical College, Lahore.*—The results of this inquiry were set out at some length in section II of the report for 1936 (page 89).

(vi) *Typhus enquiry under the Director, Pasteur Institute of India, Kasauli*.—Of the four strains of human typhus of the XK type isolated in guinea pigs, three were successfully maintained during the year, these being in their 19th generation. One strain of the 19 type is now in its 121st passage. Certain differences were noted in the Indian form of typhus XK isolated from human sources as compared with the Malayan form. Transmission experiments were carried out with these XK strains using the following arthropods bred in the laboratory:—*Xenopsylla cheopis*, *Stegomyia acutellaris*, *Liponyssus bacoti*, *Hyaloma egyptium* and *Rhipidephalus sanguineus*. No successful transmission was effected.

A study of the bionomics and the breeding of *T. deliensis* and search for the reservoir of typhus XK were commenced. This larval mite is the suspected vector of typhus XK in Malaya and Sumatra and is closely allied to *T. akamushi*, the proved vector of Tsutsugamushi in Japan. Larvæ of *T. deliensis* were recovered from the stockings of an officer who had walked through the scrub jungle in Simla hills and who was reported to have developed typhus of the XK type about a month later.

(vii) *Enquiry into typhus under the Director, King Institute, Guindy, Madras*.—Investigations demonstrated that the incidence of typhus is more extensive than was hitherto considered to be the case. Typhus from cases are likely to be missed because of their resemblance to mild cases of typhoid. The work included (a) investigation into the prevalence of tick typhus in Madras Presidency based on the Weil-Felix reaction on the sera of all fever cases sent to the King Institute, which were negative to the Widal test, (b) attempts at the isolation of (1) a virus from cases of suspected typhus and (2) of typhus virus from rodents and their ecto-parasites, and (c) investigation of the significance of the Weil-Felix reaction in normal and infected guinea pigs.

(viii) *Enquiry on filterable viruses under Lt.-Col. H. E. Shortt, I.M.S., Director, King Institute, Guindy, Madras*.—The interpretation of the findings included in the response of the chorio-allantoic membrane to infection with the various viruses studied was found to be extremely difficult. Various substances, organic and inorganic, living and dead, were inoculated into the chorio-allantoic membrane and the resultant lesions studied. It was found that aluminium gel alone among inert substances and bacteria produced lesions closely resembling those of virus infections *B. proteus* X19 and *E. typhosus*, on inoculation produced lesions passable in series from which the original organism could be recovered, unaltered morphologically or serologically. When such lesions were filtered and ground, the filtrate was also capable of producing a lesion and these lesions could be passaged indefinitely, although they were sterile to ordinary bacterial media both aerobically and anaerobically.

The possibility of the lesion-producing filterable agent being an enzyme was investigated, but no convincing evidence was obtained.

Studies on sandfly fever virus were also undertaken. The virus of sheep pox was cultivated for the first time by the chorio-allantoic membrane technique and the cultivated virus was found efficient as a prophylactic agent, whilst it had lost its generalising properties after nine passages.

(ix) *Enquiry into the etiology of splenomegaly in Bengal by Dr. M. N. De at the Medical College, Calcutta.*—This investigation was completed during the year and the conclusions arrived at are :—

- (a) In Bengal, apart from malaria and leishmaniasis, a large number of cases with enormous enlargement of the spleen and liver are met with, the causes of which remained undetermined.
- (b) The cases occur mostly in rural but only occasionally in urban areas. They were in the past grouped under malarial cachexia or chronic leishmaniasis.
- (c) The condition is endemic in Bengal, particularly in lower Bengal, and has therefore been provisionally called Bengal splenomegaly, although such a condition has also been found to occur sporadically in other parts of India.
- (d) The spleen is not only unable to discharge its normal functions but becomes positively harmful to the patient by its enormous size and also by the switching off of a large portion of the circulating blood and destroying its corpuscular elements. The histological characters also suggested an infective element of low virulence acting for a long period and producing a toxic material causing necrosis and ultimately cirrhosis of the liver and spleen.
- (e) Such a splenomegalic condition is also responsible for the greater proportion of the cases of hepatic cirrhosis with ascites so commonly met with in certain parts of Bengal.

(x) *Epidemic dropsy enquiry by Major C. L. Pasricha, I.M.S., and Dr. R. B. Lal at the School of Tropical Medicine and Public Health Institute, Calcutta.*—Investigations into the causation of this disease were continued. Three main theories hold the field (a) that it is produced by eating rice infected with certain bacteria, (b) that it is an infection which spreads by contact from person to person and (c) that it is due to some deleterious substance which is conveyed through mustard oil. Evidence in support of the third was produced on epidemiological grounds and by human experiments.

(xi) *Kala-azar enquiry by Dr. L. E. Napier at the Calcutta School of Tropical Medicine.*—During the year sand-flies were caught at different places at intervals throughout the year to find the relative incidence of *phlebotomus argentipes* from season to season. A new antimony compound,—solustibosan,—was investigated for its efficacy in treatment. The results indicated that it is of considerable value and is as effective as neostibosan. Dr. Napier visited Sikkim at the request of the State authorities to investigate the sub-epidemic of kala-azar that had spread in that State.

(xii) *Bacteriological investigations by blood culture in certain eye diseases by Dr. Purandare at the Seth G. S. Medical College, Bombay.*—This enquiry was carried out to determine the aetiology of certain eye diseases which on clinical grounds were believed to be caused by the tubercle bacillus. Of the 65 samples of blood which were cultivated on suitable media, only in two cases was there any evidence of the presence of tubercle bacilli. Haemolysed and digested deposits from eight samples of blood were injected into guinea pigs subcutaneously, and they were examined every week for four weeks. The animals showed no apparent change, tuberculin reaction was negative and post-mortem examination, macroscopically and microscopically, failed to show any evidence of tubercular infection.

(xiii) *Enquiry into mycetoma or fungus foot disease under the Dean, Seth G. S. Medical College, Bombay.*—A large number of cases was clinically diagnosed as mycetoma and on careful bacteriological and histological examination these proved to be other pathological entities. Marked benefit was found from radium treatment in a case of mycetoma of the black variety, but relatively small improvement in those of mycetoma of the yellow variety.

(xiv) *Investigations of toxicological and medicolegal importance by Rai Bahadur Dr. K. M. Bagchi, Chemical Examiner to the Government of Bengal.*—The lead content of urine and faeces of normal tissues, i.e., of those not exposed to lead in performing their legitimate duties was under investigation. The results obtained indicated that normal tissues contain an appreciable amount of lead and confirmed the findings of European workers, although the quantity of lead was found to be decidedly less than had been found in Europe. This work is being continued.

(xv) *Researches on the study of bone-marrow, etc., by Dr. H. N. Chatterjee at the Carmichael Medical College, Calcutta.*—A total of 55 specimens of bone-marrow from the post-mortems done in the Carmichael Medical College and the Medical College, Bengal, were secured. These specimens were sectioned, stained by different methods and were studied. The changes undergone by bone-marrow in respect of such infections as cholera, kala-azar, enteric fever, epidemic dropsy, Bengal splenomegaly, and chronic dysentery and a few other conditions were under investigation.

(xvi) *Inquiry into Thrombo-angeitis obliterans by Dr. R. N. Cooper at the Seth G. S. Medical College, Bombay.*—A total of 21 cases was studied. The investigations were (1) from the clinical standpoint in order to assess the functional value of the peripheral arteries and circulation; (2) from the pathological point of view by an estimation of blood chlorides and a histological study of the arteries, veins, nerves and lymphatics of an amputated limb; (3) from the standpoint of therapeutics by the intravenous administration of 300 c. cs. of 3 p. c. to 5 p. c. hypertonic solution of sodium chloride every fourth day. Marked relief from pain and improvement in respect of arrest of gangrene have been observed.

(xvii) *Pharmacological investigation of oroxylin under the Dean, Seth G. S. Medical College, Bombay.*—The anthelmintic action of oroxylin, its action on the circulatory and respiratory systems of dogs, its antiseptic action on lower organisms and astringent action were under investigation.

(xviii) *Pharmacological enquiry by Dr. Dikshit at the Haffkine Institute, Parel, Bombay.*—The action of plasmoquin on the female reproductive organs was studied. The results indicated that the drug should not deleteriously affect the course of normal pregnancy. To verify this, toxic and therapeutic doses of plasmoquin were administered to guinea pigs in different stages of pregnancy and it was found that plasmoquin was comparatively safe in pregnancy.

A chemical test for detection and estimation of minute quantities of plasmoquin in tissues was developed. It was shown that atabrin remained in blood only for a short time and that it diffused into the tissues very rapidly. This throws doubt on the theory that the drug acts directly on malarial parasites in the circulation in producing a cure of the disease.

Work on acetylcholine and choline esterase was continued.

Research work in Medical Colleges.

100. As in previous years, a considerable amount of research work was carried out at different medical colleges and the following paragraphs give a brief summary of this important activity of the medical teaching institutions.

Seth Gordhandas Sunderdas Medical College, Bombay.—Investigations were carried out in a number of different subjects which included (1) Balanced diets (under the auspices of the I. R. F. A. and Sir Dorabji Tata Trust and in collaboration with the Baby and Health Week Association); (2) Basal metabolism in children and adults; (3) Mycetoma or fungus foot disease; (4) Bacteriological studies by blood culture in certain eye diseases; (5) Pharmacological investigation of oroxylin and (6) Thrombo-angietis obliterans (under the Indian Research Fund Association); (7) The incidence of pneumococcal type infection in Bombay; (8) Virulence of the tubercle bacillus; (9) Mesenteric revascularisation; (10) Development of the body parts of children between six and 11 years of age; (11) Excretion of vitamin "C" in urine; and (12) Diet survey in Bombay (under the G. S. M. College and K. E. M. Hospital Research Fund).

University of Lucknow, Faculty of Medicine.—Investigations were carried out into the method of biological assay of liver extracts, the action of arsenical preparations and *mica bhasm*, and *ayurvedic* preparation reported to be of benefit in cases of chronic bronchitis and asthma. This *bhasm* had no effect either on the blood pressure or the respiration of dogs under morphine-urethane anaesthesia.

King Edward Medical College, Lahore.—Work on the types of pneumococci prevalent in the Punjab was carried out.

Medical College, Calcutta.—In the Department of Chemistry research on the copper content of food stuffs and human viscera was undertaken. The Department of Physiology carried out further researches on the rôle of formalin in the estimation of nitrogen in body fluids. A comparative study of glycolysis in normal and diabetic bloods was also made. Investigations in the Department of Pathology included pathogenesis of splenomegaly, leukaemia in children, study of chordoma, actinomycosis, non-pulmonary tuberculosis lesions, malignant diseases of the male breast tissue and ovarian tumours. In the Department of Pharmacology, the pharmacological action of carpaine, an alkaloid from *carica papyra* was tested.

Carmichael Medical College, Calcutta.—Investigations on the chemotherapy of tumours were made in the Biochemistry Department, as also the preparation of a treatment vaccine containing an organism isolated from the stools of patients suffering from epidemic dropsy. Work on cholera and cholera-like vibrios was also done.

Prince of Wales Medical College, Patna.—Investigations included :—(1) Observations in anaemia on the sedimentation rate, number, size, haemoglobin content and fragility of erythrocytes; (2) Immunological reactions in ankylostomiasis as an aid to diagnosis; (3) Oral and throat organisms in apparently normal individuals; (4) The technique in blood culture and the multiplication of organisms in the blood; (5) Therapeutical observations on vitamin subnutritional conditions; (6) Muelengracht's diet modified to suit local Indian dietary for the treatment of peptic ulcer; and (7) Effect of analeptic drugs on respiratory and cardiac depression produced by cobra venom.

Medical College, Madras.—An investigation was in progress into the etiology of tropical lymph-node enlargements. A systematic examination of suspected cases of lymphogranuloma inguinale was carried out for the purpose of preparing Freis' antigen for diagnostic tests. The study of the pharmacological action of various synthetic derivatives of cotarnine was continued, and investigations were carried out on fluorine intoxication, on the effects of anaemia on cardiac size, on ankylostomiasis, on tropical megalocytic anaemia, on Witt's anaemia and on pulmonary amoebiasis. A diet-survey of the hostels in Madras and analysis of certain food-stuffs was started by the Hygiene Department. Work on the preparation of the sex hormones of pregnancy urine in a standardized form suitable for oral administration was being continued. The study of the pharmacological action of Hedyotine, the alkaloid of *Hedyotis auricularia*, was in process.

Grant Medical College, Bombay.—Researches carried out included (1) Histological classification of appendicitis; (2) Benzopyrene tumours in mice; (3) Parasitic contents of Bombay rats; (4) Haematological studies; (5) Experimental study of ulcer of the stomach; (6) Basal metabolic rate; (7) Studies in haemolysis; (8) Constituents of the blood and urine in health and disease, especially blood calcium, phosphorus and phosphatase in rickets; and (9) Experiments on dogs to investigate the action of certain new drugs, e.g., cucortin (suprarenal cortex), (angioxyl) pancreatic hormone and acetyl choline, on blood pressure.

Pasteur Institutes and Anti-rabic treatment.

101. *Researches.*—Researches were carried out at the Pasteur Institutes in Kasauli and Shillong. Details concerning the former have been included in the section dealing with I. R. F. A. activities; those relating to the latter are given on page 183.

Facilities for anti-rabic treatment were available at the Pasteur Institutes in Kasauli, Coonoor, Shillong, and Patna, in the Haffkine Institute in Bombay, and the School of Tropical Medicine, Calcutta. The number of anti-rabic treatment centres has increased considerably during recent years and these are now widely spread all over India including a number of Indian States. A complete list is attached to this Section as Appendix D.

Details of the work of the various Pasteur Institutes mentioned will be found in the following publications:—

1. Pasteur Institute of India, Kasauli.—37th Annual Report of Central Committee of the Association and the Report of the Director of the Institute for 1937-38.
2. Pasteur Institute of Southern India, Coonoor.—The Annual Report of the Director for the year ending 31st December 1937, together with the 31st Annual Report of the Central Committee of the Association for the year ending 31st March 1938.
3. King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong.—The 21st Annual Report for 1937. Assam Government Press, Shillong.
4. Pasteur Institute, Bombay.—Report of the Haffkine Institute for the year 1937. The Government Central Press, Bombay.
5. Annual Report of the Pasteur Institute, Patna, and of the Anti-rabic Centre, Cuttack, for 1937. Superintendent, Government Printing, Bihar, Patna.
6. Pasteur Institute, Calcutta.—Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases for 1937. Obtainable from the Director, School of Tropical Medicine, Calcutta.

Methods of treatment.—Methods of treatment employed at the different institutes are summarised below :—

The vaccine employed both at Kasauli and at its centres is a carbolized five per cent. Paris Sheep brain vaccine. The brain of a sheep, which is completely paralysed as the result of infection with Paris fixed virus, is made into an eight per cent. emulsion with one per cent. carbolic acid in normal saline. This is incubated for 24 hours at 37°C. and then diluted with normal saline to make a five per cent. emulsion. The vaccine is kept at room temperature for at least 30 days before use. The dosage administered for Class I cases consists of 2 c. c. daily for seven days; Class II cases 2 c. c. daily for 14 days; Class III, adults, 5 c. c. daily for 14 days; Class III, children, 3·5 c. c. daily for 14 days; Class IV, adults, either seven or ten c. c. daily for 14 days; and Class IV, children, either five or seven c. c. daily for 14 days. Serum treatment in addition to the ordinary vaccine treatment was given to a number of Class IV cases at the institute and at the centres in Agra, Benares, Dehra Dun, Jhansi, Lahore, Lucknow, Multan, Rohtak and Rawalpindi.

At the Pasteur Institute in Coonoor, Paris fixed virus was used exclusively in the preparation of the vaccine. It was in its 994th passage at the end of the year. The vaccine used was Semple's five per cent. carbolised sheep-brain suspension. Treatment was administered to patients as under :—

Class.	Adult dosage.	Child dosage.	Duration in days.
I	2 c. c.	2 c. c.	7
II	2 c. c.	2 c. c.	14
III	5 c. c.	3·5 c. c.	14
IV-A	7 c. c.	5 c. c.	14
IV-B	10 c. c.	7 c. c.	14

Patients bitten on the face were classified as IV-A.

At the Pasteur Institute in Shillong and at its centres no change was made in the method of preparation or in the scheme of treatment. Paris virus was used and the vaccine consisted of a carbolised five per cent. sheep brain emulsion.

At the Calcutta institute and its centres all classes were treated with five per cent. carbolised vaccine. Paris sheep virus was used and treatment lasted for 14 days except in class I (lick cases) in which treatment was given for seven days only.

At the Patna Institute, the vaccine in use throughout the year was Semple's carbolised vaccine one per cent. made from sheep's brain with the Paris strain of fixed virus. The dose given was 5 c. c. daily for seven days in lick cases and 5 c. c. daily for 14 days in cases of bites.

The division of patients into four classes referred to in the above paragraph is as follows :—

Class I.—Cases not bitten but in which the saliva of a suspected rabid animal has come in contact with fresh cuts or abrasions (licks).

Class II.—Superficial but not extensive bites on the trunk and extremities excluding the fingers.

Class III.—(a) All superficial bites on the fingers.

(b) Superficial extensive bites on all parts of the body except head and neck.

(c) Deep but not extensive bites on all parts of the body except head and neck.

Class IV.—(a) Deep extensive bites on all parts of the body.

(b) All bites and scratches on the head and neck.

A wound in which the true skin is not broken is taken as superficial bite.

One in which the true skin has been broken is taken as a deep bite and any wound one quarter of an inch long or over is classed as an extensive bite.

No. of persons treated.—With the decentralisation of anti-rabic treatment in India, its use has increased very much during recent years. A perusal of Table VIII (iii) which gives the numbers of treatments carried out at the different institutes and their centres during different years indicates the extent to which treatment has expanded.

TABLE VIII (iii).

Year.	No. of patients treated.					
	Kasauli.	Coonoor.	Shillong.	Bombay.	Calcutta.	Patna.
Average 1900-04 .	587					
„ 1905-09 .	1,260	393				
„ 1910-14 .	3,291	1,102				
Average 1915-19 .	5,560	2,348	1,015			
„ 1920-24 .	7,261	4,331	1,862	2,209	1,461	
„ 1925-29 .	8,474	4,996	1,176	4,952	6,282	908
1930 . . .	9,653	6,640	1,198	5,742	6,958	2,854
1931 . . .	11,147	8,781	1,172	7,059	7,761	2,837
1932 . . .	12,801	9,770	1,269	7,483	7,250	3,289
1933 . . .	15,938	9,557	1,305	8,031	7,532	3,960
1934 . . .	16,851	11,203	1,755	7,636	1,134	4,469
1935 . . .	16,627	13,062	1,554	8,122	5,248	4,238
1936 . . .	18,620	13,005	1,825	8,092	5,148	4,075
1937 . . .	20,936	11,733	1,809	9,858	6,565	4,432

Table VIII (iv) gives figures of treatments given during 1937 at the different institutes and centres.

TABLE VIII (iv).

	No. of patients treated.						Total advice cases.
	Europeans.			Indians.			
	Institute.	Centres.	Total.	Institute.	Centres.	Total.	
Kasauli .	63	1,341	1,404	780	18,752	19,532	2,238
Coonoor .	33	318	351	393	10,989	11,382	161
Shillong .	3	87	90	145	1,574	1,719	163
Bombay .	121	255	376	2,892	6,590	9,482	515
Calcutta .	160	202	362	1,059	5,144	6,203	1,087
Patna .	14	1	15	2,824	1,593	4,417	168

Mortality.—Of the total of 55,333 persons treated, 225 died. The percentage mortality was thus 0·41. Table VIII (v) gives the total number of deaths amongst patients treated, along with the percentage of mortality to the total treated.

TABLE VIII (v).

	Institute.		Centres.		Total.	
	Deaths.	Death rate per cent.	Deaths.	Death rate per cent.	Deaths.	Death rate per cent.
Kasauli	5	0.59	85	0.42	90	0.43
Coonoor	2	0.47	21	0.19	23	0.20
Shillong	1	0.67	15	0.90	16	0.89
Bombay	3	0.10	45	0.66	48	0.49
Calcutta	2	0.16	38	0.71	40	0.61
Patna	5	0.17	3	0.18	8	0.18

The mortality rates per cent. of persons treated are very low in the case of all institutes, although the lack of similar figures for those who were bitten and did not undergo treatment renders it impossible to assess the value of the treatment.

Information relating to species of biting animal, evidence of rabies in the biting animal, number of wounds and interval between the date of bite and the date of commencing treatment are given below in a series of Tables VIII (vi) to VIII (ix).

Species of biting animal.—The percentages of persons bitten by different animals have been set out in Table VIII (vi); the figures are inclusive of centres.

TABLE VIII (vi).

	Kasauli.	Coonoor.	Shillong.	Bombay.	Calcutta.	Patna.
Dog	84.48	95.01	85.24	90.76	80.38	62.79
Jackal	8.51	1.59	8.18	6.89	16.27	33.96
Cat	0.28	0.71	1.27	0.70	0.94	0.36
Wolf	0.11	..	..	0.06	..	..
Human being	2.75	6.14	2.38	0.31	0.35	0.34
Others	3.88	2.07	2.93	1.28	2.06	27.75

Dogs are the commonest type of biting animal and dogs and jackals together are responsible for well over 90 per cent. of the total.

Evidence of rabies in the biting animal.—Table VIII (vii) gives the percentages of persons treated at the different institutes inclusive of centres classified in different categories.

TABLE VIII (vii).

	Kasauli.	Coonoor.	Shillong (institute only).	Bombay.	Calcutta.	Patna.
Animal proved rabid .	5.1	3.3	21.0	3.25	1.5	0.6
Animal certified rabid .	4.2	1.8	2.7	3.15	2.9	1.5
Animal probably rabid according to history .	68.6	57.7	61.5	55.53	73.0	41.8
History of animal unknown	21.4	36.8	12.8	38.07	21.8	55.7
Animal probably not rabid according to history	0.7	0.4	2.0	..	0.8	0.4

Animals rabid either according to definite evidence or according to history form a major proportion of the total in the case of all institutes except that of Patna.

No. of wounds.—Table VIII (viii) gives the numbers of patients treated at the different institutes and their centres according to the number of wounds.

TABLE VIII (viii).

Number of wounds.	Kasauli.	Coonoor.	Shillong (institute only).	Bombay.	Calcutta.	Patna.
0	15.07	4.99	21.62	5.75	5.27	2.75
1	21.33	20.92	18.92	15.09	16.04	15.80
2	21.20	30.86	14.86	29.28	22.96	28.83
3	14.36	18.33	12.16	20.11	16.53	16.58
4	9.77	11.80	4.73	15.59	14.85	12.75
5	5.38	5.01	5.41	5.26	8.27	7.02
6	3.92	2.55	6.08	3.90	5.70	4.87
7	2.55	1.47	3.38	1.71	3.56	3.05
8	1.81	1.11	1.35	1.29	2.10	2.28
9	1.06	0.54	2.70	0.50	1.48	1.31
10	0.95	0.48	3.38	0.46	0.98	1.35
11	0.56	0.20	0.68	0.33	0.53	0.74
12	0.45	0.27	..	0.23	0.73	0.81
13	0.29	0.16	0.68	0.09	0.12	0.27
14	0.32	0.10	..	0.15	0.27	0.38
15	0.17	0.03	0.68		0.21	0.34
16	0.17	0.03	0.68		0.09	0.16
17	0.11	0.03	0.68		0.03	0.16
18	0.10	0.03	0.68	0.22	0.05	0.16
19	0.09	..	..		0.02	0.07
20	0.09	0.01	..		0.03	0.07
Over 20	0.26	0.06	1.35		0.18	0.25

More than one wound was inflicted in over 60 per cent. of the cases.

Lateness of arrival.—Table VIII (ix) gives the percentages of patients for each institute according to the interval between the date of bite and the date of commencing treatment. The figures are inclusive of out-centres.

TABLE VIII (ix).

Days late.	Number of cases.					
	Kasauli.	Coonoor.	Shillong (institute only).	Bombay.	Calcutta.	Patna.
0	5.18	4.71	22.97	10.98	5.18	1.22
1	17.62	19.03	24.32	29.47	14.82	7.81
2	18.07	12.96	18.91	16.79	12.33	10.49
3	14.28	13.38	9.45	12.99	10.31	12.90
4	10.96	10.79	5.41	9.31	9.93	15.07
5	7.10	9.48	0.67	4.80	6.18	8.77
6	5.00	6.88	2.70	3.06	6.31	7.98
7	4.26	5.28	2.70	1.91	6.98	6.84
8-14	9.82	13.08	5.41	6.46	18.71	19.62

Number of wounds.

Days late.	Kasauli.	Coonoor.	Shillong (institute only).	Bombay.	Calcutta.	Patna.
15-24	3.57	3.11	1.35	2.02	4.72	5.19
22-28	0.96	0.55	2.03	0.41	1.54	1.20
29-35	1.26	0.78	1.35	0.82	1.23	1.44
36-42	0.26	0.20	1.35	0.20	0.29	0.07
43-49	0.38	0.10	0.67	0.27	0.26	0.27
50 and over	1.25	0.65	0.67	0.51	1.20	1.11

In respect of Kasauli, Coonoor, Bombay and Shillong over 70 per cent. of the patients commenced treatment within five days of being bitten, whilst in Calcutta and Patna the corresponding percentages were 59 per cent. and 56 per cent. respectively.

SECTION IX.

HEALTH OF JAILS IN INDIA.

General.

102. As Burma and Aden were separated from India on 1st April, 1937, the figures relating to these areas have been excluded. In comparing the figures for the year under review with those of 1936 and with quinquennial means, the Burma and Aden figures have also been omitted.

Jail vital statistics fall into two groups, (1) those relating to jails of all classes and (2) those for district and central jails combined. This classification is necessary because, in respect of such matters as population, accommodation and admissions to hospitals, figures for all classes of jails are available, whilst in respect of diseases, figures for all provinces are available only for the populations of district and central jails.

Jails of all Classes.

103. *Population, Accommodation and Overcrowding.*—Table IX (i) gives the authorised accommodation and the daily average population in jails and sub-jails during 1937. The figures for 1936 are included for purposes of comparison.

TABLE IX (i).

Province.	Authorised accommodation excluding hospitals and observation cells.		Daily average population.	
	1936.	1937.	1936.	1937.
N.-W. F. P.	5,263	5,263	6,524	6,227
Punjab	15,013	15,013	21,337	20,431
U. P.	32,162	32,150	31,049	29,782
Bihar	13,007	12,987	11,958	11,029
Orissa	1,948	2,257	1,438	1,733
Bengal	17,091	16,351	22,718	21,331
C. P.	6,542	6,538	5,296	4,942
Bombay*	14,995	14,983	9,357	8,865
Sind	5,260	5,142	4,365	4,663
Madras	18,468	18,575	15,967	14,718
Assam	3,704	3,772	4,019	3,566

The figures for authorised accommodation show little variation over those of the previous year. Although in every province except Orissa and Sind, the daily average population decreased, the numbers were in excess of authorised accommodation in Bengal, Punjab and the North-West Frontier Province. In Bengal, although some prisoners were housed in temporary overflow accommodation, overcrowding continued to exist in the convict and

NOTE.—Figures relating to the Andamans have been dealt with separately on pages 12—14. The statistics given in other sections are exclusive of the Andamans.

* Including Dharwar Borstal School.

Abbreviations:—

N.-W. F. P.—North-West Frontier Province.

U. P.—United Provinces.

C. P.—Central Provinces.

undertrial wards, especially in the central jails. It is expected that this overcrowding will be reduced on completion of the Dum Dum Central Jail. In the Punjab, although a reduction of 906 occurred in the daily average population, authorised accommodation continued to be far short of requirements. A similar decrease in average population in the North-West Frontier Province also reduced the problem of overcrowding to some extent.

In other provinces, the daily average population was below the authorized accommodation, but this does not mean that, on particular occasions, the jail population was not in excess of accommodation. In Sind, although the daily average population was below the authorised accommodation for the province as a whole, the numbers were in excess in Hyderabad central prison and in Sukkur and Karachi district prisons. The construction of a new central prison which is in progress will no doubt relieve present overcrowding. In Assam, some overcrowding existed in the Gauhati district jail for a period of the year. In Bihar, in spite of a fall in the daily average number of prisoners of all classes, overcrowding existed in all central jails and in some district jails, the population being usually much in excess of available accommodation. In order to relieve congestion, the jails at Arrah, Chaibassa and Daltonganj were used as district jails and for the same reason, in Orissa the jails at Balasore and Angul were similarly utilised. In C. P. funds were allotted for a new subsidiary jail at Narsinghpur and an additional barrack for the Borstal Institution there. With this extra accommodation, some relief will be given to the steadily increasing overcrowding in the Borstal Institute. In U. P., there was no overcrowding.

Constantly sick.—Table IX (ii) gives the daily average numbers of constantly sick and the sick rates per 1,000 among all classes of prisoners in the different provinces for 1936 and 1937.

TABLE IX (ii).

Province.	Average numbers of constantly sick.		Constantly sick rate per 1,000.	
	1937.	1936.	1937.	1936.
N.-W. F. P.	140	155	22	24
Punjab	435	446	21	21
U. P.	536	651	18	21
Bihar	255	267	23	22
Orissa	46	29	27	20
Bengal	761	794	36	25
C. P.	43	46	8	9
Bombay*	137	153	15	16
Sind	96	84	21	19
Madras	200	250	14	16
Assam	78	92	22	23

*Including Dharwar Borstal School.

It will be seen that during 1937 Bengal recorded once more much the highest constantly sick rate, whilst that of the C. P. was lowest. In Orissa, the sick rate increased considerably as compared with the previous year, but this had no effect on the death rate of the jail population. On the contrary this fell sharply from 19·9 *per mille* of the average strength in 1936 to 7·5 *per mille*. In the provinces of Bihar, Bengal and Sind slight increases were recorded; in other provinces the sick rates were the same as in 1936 or showed slight decreases.

Admissions to hospital and deaths.—Table IX (iii) gives the numbers of hospital admissions and of deaths for all classes of jails. Admission and death rates per thousand of the average strength have also been calculated. Figures for 1936 are given for purposes of comparison.

TABLE IX (iii).

Province.	Admissions.				Deaths.			
	Number.		Rate per 1,000 of average strength.		Number.		Rate per 1,000 of average strength.	
	1937.	1936.	1937.	1936.	1937.	1936.	1937.	1936.
N.-W. F. P.	2,545	3,457	409	530	77	54	12	8
Punjab	9,371	12,062	459	565	177	209	9	10
U. P.	13,464	15,967	452	514	230	255	8	8
Bihar	4,219	4,812	383	402	143	176	13	15
Orissa	935	1,189	540	826	13	28	8	20
Bengal	19,198	21,244	900	935	234	276	11	12
C. P.	1,138	1,202	230	227	84	92	17	17
Bombay*	4,676	4,440	527	475	82	93	9	10
Sind	3,426	2,850	735	653	64	53	14	12
Madras	4,165	4,665	283	292	146	150	10	9
Assam	1,411	1,686	396	420	55	57	15	14

*Including Dharwar Borstal School.

As regards admission rates, decreases were recorded in all provinces except C. P., Bombay and Sind, the reduction being as much as 286 *per mille* in Orissa. The increase in C. P. was insignificant and in Sind it was due to an increased incidence of malaria.

Death rates also fell in most provinces, N.-W. F. P., Sind, Madras and Assam being exceptions. As regards N.-W. F. P., only twice in the last five years has the death rate been lower than that for 1937; in the other three provinces, the increase was insignificant.

Weight of prisoners.—Table IX (iv) gives in percentages the average gain or loss in weight of convicts on discharge from all classes of jails. Provincial figures are arranged in order of loss of weight.

TABLE IX (iv).

Province.	Gained weight.	Stationary.	Lost weight.
C. P.	68	24	8
N.-W. F. P.	59	32	9
Madras	63	28	9
Punjab	45	45	10
U. P.	60	30	10
Orissa	62	27	11
Bihar	56	31	13
Bengal	47	38	15
Assam	56	28	16
Bombay	58	23	19
Sind	30	41	29

Dietary, hospital, clothing and bedding and sanitation charges.—Table IX (v) gives details for 1937 of dietary, hospitals, clothing and bedding and sanitation per capita charges calculated on the average jail population.

TABLE IX (v).

Province.	Dietary charges per head.	Hospital charges per head.	Clothing and bedding charges per head.	Sanitation charges per head.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
N.-W. F. P. . . .	35 9 0	5 4 8	11 7 6	1 3 10
Punjab	35 1 11	4 7 9	7 11 9	2 5 9
U. P.	29 1 11	2 3 8	3 10 1	1 8 6
Bihar	36 9 5	5 5 10	5 13 0	2 11 3
Orissa	36 11 1	5 12 1	6 5 2	1 14 11
Bengal	39 8 0	7 9 0	3 10 0	3 4 0
C. P.	30 13 2	4 8 1	6 2 2	0 14 5
Bombay	43 1 5	1 10 8	3 8 5	7 9 2
Sind	39 0 3	2 13 4	5 6 5	3 1 7
Madras	40 1 5	3 6 2	5 4 11	3 8 4
Assam	33 15 3	4 1 6	4 10 3	0 11 9

District and Central Jails.

104. As already mentioned, figures for diseases are available for all provinces only for the populations of district and central jails. These figures are given in the appended table A, Appendix VIII.

The principal recorded causes of sickness in district and central jails are given in Table IX (vi).

Malaria as usual was responsible for much the largest amount of sickness.

TABLE IX (vi).

	1937.		1936.	
	Admissions.	Rate p. m.	Admissions.	Rate p. m.
Malaria	14,205	122	18,400	150
Abscess, ulcer and boil	4,582	37	4,680	38
Respiratory diseases*	3,764	32	3,446	28
Influenza	3,659	31	5,290	43
Dysentery	3,533	30	4,250	35
Diarrhoea	1,950	17	2,179	18
Pneumonia	1,127	10	1,336	11
Anæmia and debility	922	8	977	8
Pyrexia of uncertain origin . . .	922	8	757	6
Tubercle of the lungs	588	5	798	6
Kala-azar	300	3	311	3
Enteric fever	236	2	250	2
Sandfly fever	144	1	424	3
C. S. fever	97	1	114	1

*Excluding pneumonia and tubercle of the lungs.

The chief causes of mortality are shown in Table IX (vii).

TABLE IX (vii).

	1937.		1936.	
	Deaths.	Rate. p. m.	Deaths.	Rate. p. m.
Pneumonia	236	2.0	271	2.2
Tubercle of the lungs	208	1.8	241	2.0
Dysentery	92	0.8	104	0.8
C. S. fever	47	0.4	63	0.5
Malaria	44	0.4	55	0.4
Other respiratory diseases*	42	0.4	47	0.4
Influenza	35	0.3	31	0.3
Anæmia and debility	32	0.3	31	0.3
Enteric fever	30	0.3	33	0.3

* Excluding pneumonia and tubercle of the lungs.

The death rate from all causes was 10 *per mille* as against 11 *per mille* during 1936 and 11 *per mille* the quinquennial average. In the U. P. and Orissa, the rate was only 8.0 *per mille*; in C. P. the highest figure of 17 *per mille* was recorded.

Some brief comment may be made in respect of the more important diseases :—

Cerebrospinal meningitis.—Ninety-seven cases with 47 deaths were recorded. These included 45 cases with 16 deaths in the Punjab, 27 and 16 in the U. P., 18 and 9 in the C. P., four and three in Bengal, two and two in Sind and one fatal case in Delhi. In the Punjab, 34 cases with 10 deaths occurred in Multan district jail, other jails affected being Lahore Central, Lahore Borstal institution, and Sialkot, Jhelum, Ferozepore and Ludhiana district jails. The rate of mortality was lower than that of the previous year. In the U. P., outbreaks occurred in Agra central prison and in Saharanpur district jail, resulting in eight and six deaths respectively. In the C. P., the jails at Akola, Amraoti and Nagpur were affected. In Bengal, three cases were recorded in Alipore Central Jail with two deaths and one fatal case occurred in the Dum Dum Special Jail "A". In Sind, two fatal cases occurred in Hyderabad central prison. No cases were recorded in Bombay, Assam, the N.-W. F. P., Bihar, Orissa and Madras.

Influenza.—The number of cases from this disease decreased from 5,290 in 1936 to 3,659 during the year under review, this figure also being smaller than the quinquennial average of 4,706 and in every province except C. P. and Sind, the incidence was lower. Bengal as usual recorded the highest admission rate (102 *per mille*). In C. P. the incidence increased from 21 cases in 1936 to 151, the quinquennial average being 113. This was partly due to a severe epidemic in the months of January and February in the Amraoti district jail. The death rate for all-India was the same as that recorded in 1936.

Cholera.—Eleven cases and three deaths were recorded as compared with nine cases and two deaths during 1936, but these figures showed a decrease as compared with the quinquennial mean. The eleven cases included seven attacks with two deaths in U. P., two cases with one death in Bombay Presidency and one case each in Bihar and Bengal.

Smallpox.—Thirty-three admissions with two deaths were reported during the year as against 64 cases with six deaths during 1936 and 57 cases with three deaths, the mean figures for the previous five years. Of the total, 10 cases and one death were recorded in Bengal Presidency, nine cases and one death in the U. P., six cases in the Punjab and two cases each in N.-W. F. P., Sind, Madras and Assam. In the provinces of Bihar, Orissa, C. P. and Bombay no cases occurred.

Plague.—This disease was absent.

Enteric fever.—Admissions numbered 236 with 30 deaths. These figures compare favourably with those for 1936, *viz.*, 250 cases with 33 deaths and with the quinquennial average of 279 admissions and 34 deaths. The three sets of figures give a uniform rate of 2.0 and 0.3 *per mille* respectively for admissions and deaths. Of the total, 66 admissions with four deaths were recorded in the Punjab, 33 and three in the U. P., 32 and eight in the N.-W. F. P., 29 and three in Bihar, 22 and three in Sind, 22 and one in Bombay, 21 and six in Bengal, three each in Madras and Delhi, two in Ajmer, one fatal case each in C. P. and Assam and one case in Rajkot.

Kala-azar.—Admissions numbered 300 with 10 deaths, of which 169 and five respectively were recorded in Bengal, 119 and four in Bihar, seven and one in Assam, four cases in the U. P. and one in Orissa.

Dysentery.—Admissions numbered 3,533 with 92 deaths, the ratios *per mille* being 30 and 0.8 respectively of the average strength. These figures compare favourably with the numbers recorded during 1936, *viz.*, 4,250 and 104 and the quinquennial average 4,863 and 94. Assam, as usual, recorded the highest admission ratio of 98 *per mille*. In this province, cases occurred in all jails except those at Silchar, Kohima, Aijal, Nowgong and Sunamganj. In Bombay Presidency, the number of admissions rose from 137 in 1936 to 254. The increase was partly due to fouling of the water supply of Yeravda Central Prison from a defective pipe. High rates, apart from Assam, were also recorded in Sind 70 *per mille*, Bengal 61 *per mille*, and Bihar 47 *per mille*. Low rates were recorded in N.-W. F. P., the Punjab (4.0 *per mille*), U. P. (15 *per mille*), and C. P. and Madras (23 *per mille* each). Bengal Presidency as usual recorded the large number of admissions (1,176). In the Punjab, the improvement recorded during 1936 was steadily maintained and a majority of the district and central jails had no admissions. In Bihar, while a general fall in the incidence occurred in the province as a whole, there was a considerable increase in the admissions to hospital in the central jail at Hazaribagh. In Orissa, similarly, whilst the number of admissions for the province as a whole remained the same, the Puri jail recorded an increased number of hospital cases. In C. P., the jails at Amraoti and Betul returned the largest number of admissions, whilst in Madras Presidency, Bellary had the largest number.

Diarrhœa.—As with dysentery, a decrease in the incidence of diarrhœa occurred during the year under review, the total number of cases recorded being 1,950 as against 2,179 in 1936 and 2,843, the average for the previous five years. Whilst the number of deaths decreased only slightly, the death rate remained the same as during the previous year and the quinquennial mean, *viz.*, 0.2 *per mille* of average strength. Bengal Presidency as usual recorded the largest number of admissions, *viz.*, 858 or 44 per cent. of the total, the rate being 44 *per mille*. Other high rates were Sind 35 *per mille*, Orissa 27 *per mille* and Bombay 23 *per mille*. In Assam and

Madras, the rate was only 2.0 *per mille* and in N.-W. F. Province 3.0 *per mille*. In the C. P., the disease decreased by more than half as compared with the previous year.

Combined figures for dysentery and diarrhoea are given in Table IX (viii) below :—

TABLE IX (viii).

	Admission rate p. m.			Death rate p. m.		
	1937.	1936.	Mean	1937.	1936.	Mean
	1932—36.			1932—36.		
India	47	53	62	1.0	1.0	0.9
N.-W. F. P. . . .	7	7	17	0.8	0.5	0.3
Punjab	13	19	41	0.2	0.3	0.9
U. P.	27	22	28	0.3	0.6	0.5
Bihar.	60	80	105	1.8	2.0	1.5
Orissa	64	92	73	0.9	..	1.4
Bengal	105	125	127	1.8	1.9	1.4
C. P.	31	49	53	2.1	2.5	1.5
Bombay	58	39	66	0.7	0.5	0.3
Sind	105	112	98	0.8	1.4	1.2
Madras	25	36	42	0.8	1.1	1.1
Assam	100	93	122	3.9	1.7	2.8

Malaria.—Considerable decreases were recorded both in incidence and mortality. Total admissions numbered 14,205 with 44 deaths as against 18,400 admissions with 55 deaths during the previous year and 21,511 admissions and 67 deaths, the average figures for the past five years. Every province, except C. P., Bombay and Sind, shared in the general decrease. In C. P., Raipur, Betul, Amraoti and Akola jails recorded the largest numbers of admissions. In Bombay Presidency, marked increases were recorded at Yeravda central prison and Ahmedabad central prison which the Inspector General of Prisons attributed partly to a number of cases being diagnosed clinically and not microscopically. In the same province, Arthur Road prison showed a marked decrease said to be due to persistent efforts to compel the municipality to deal with the drains surrounding the prison. In Sind, spraying with "Pyrocid 20" was carried out at the barracks at the Hyderabad central prison, but the results were not satisfactory. Amongst those provinces which did not record an increased incidence, a noticeable decrease as compared with last year has occurred in the Punjab. In that province, strenuous efforts were continued towards eradication of mosquitoes. In U. P. the disease was well under control and in Madras Presidency anti-malarial measures were carried out in all jails. In Bengal Presidency, the jails of Rajshahi, Midnapore, Mymensingh, Dum Dum, Hijli Additional Special, Comilla and Jessore jails were responsible for the greater number of admissions. Jorhat jail in Assam and Bellary jail in Madras had as usual the highest numbers of admissions in these provinces.

The general malaria death rate of 0.4 *per mille* was the same as during the previous year, this figure comparing favourably with the average figure of 0.5 *per mille* for the past five years. The rate of 0.9 *per mille* was recorded in Bengal Presidency, and no deaths were recorded in Orissa, Sind and Assam.

Pneumonia.—A further fall occurred in the number of admissions and deaths. Total admissions and deaths recorded during the year were 1,127 and 236 respectively as against 1,336 and 271 during the previous year and 1,477 and 312 for the previous quinquennium. The rates *per mille* of average strength also showed similar decreases from 11 *per mille* and 2·2 *per mille* in 1936 and from 12 *per mille* and 2·5 *per mille*, the quinquennial averages, to 10 *per mille* and 2·0 *per mille* during the year under review. Of the total, 252 admissions with 61 deaths were recorded in the U. P., 240 and 43 in Bengal, 141 and 27 in the Punjab, 101 and 16 in the N.-W. F. P., 89 and 16 in Sind, 84 and 20 in Bihar, 66 and 18 in Madras, 57 and 10 in Assam, 36 and 11 in Bombay, 33 and nine in the C. P. and four and two in Orissa.

The highest admission rate of 23 *per mille* was recorded in Sind, this figure being followed by 16 *per mille* in Assam and the N.-W. F. P. and 12 *per mille* in Bengal.

The highest mortality rate of 4·2 *per mille* was recorded in Sind. Other provincial rates were 2·8 in Assam, 2·6 in N.-W. F. P., 2·2 in Bengal, 2·1 each in Bihar and C. P., 2·0 in U. P., 1·8 in Orissa and 1·5 each in the Punjab, Bombay and Madras.

Tubercle of the lungs.—Both admissions and deaths showed a further decline. The numbers decreased from the quinquennial figures of 749 and 235 and from 798 and 241 during 1936 to 588 and 208 during the year under review. The rates *per mille* of average strength also declined from 6·0 and 2·0 *per mille* during 1936 to 5·0 and 1·8 *per mille* respectively in 1937. Admission and death rates for individual provinces will be found in Table A, Appendix VIII.

In regard to deaths from tubercle of the lungs amongst convicts in all classes of jails, in the N.-W. F. P. admissions and deaths increased as compared with the figures for 1936. Of the total of 20 deaths, 10 took place in the Abbottabad Jail where tuberculosis patients are concentrated. In the Punjab the number of admissions decreased from 255 to 251 in 1937, whilst deaths fell from 65 to 53. The incidence of tuberculosis in the jails of the United Provinces showed a marked fall as did the mortality. In Bihar, admissions rose from 66 to 72, whilst deaths totalled 37. The central jails at Buxar and Bhagalpur and the district jail at Purnea recorded the largest numbers of admissions and deaths. Six deaths were recorded in the central jail at Gaya and four at Hazaribagh. In Orissa, there were 10 admissions to hospital with two deaths, one fatal case in Puri jail and one admission in the Sambalpur jail. There were 94 cases and 28 deaths against 117 and 46 respectively in 1936 in Bengal, Presidency and Alipore central jails in Calcutta had large numbers of admissions and these two central jails and the Dacca central jail recorded the largest numbers of deaths. Admissions increased by one in the C. P., but deaths decreased by three. There were 35 admissions and 16 deaths in Bombay Presidency and 24 and 10 in Sind. In Madras Presidency, although admissions fell from 111 to 61, the deaths increased from eight to 23. The Wellesley Sanatorium Jail, Bellary, where all phthisis cases are concentrated recorded 13 deaths. In Assam, admissions and deaths decreased from 52 and 14 in 1936 to 27 and 10. Nine of these cases and two deaths occurred in the Sylhet district jail, where most of the cases from the province are concentrated.

Accommodation has been provided for the segregation and treatment of tubercular patients in a number of provinces. In N.-W. F. P. the Abbottabad jail has a ward containing 40 beds. In Punjab, the new central jail at Multan has accommodation for 138 tuberculosis patients. The Sultanpur jail in U. P.

has 158 beds. In Bihar, arrangements for housing tubercular cases exist at Bhagalpur (35 beds), Buxar (12 beds) and Gaya central jail (six beds). The district jail at Purulia also provides four beds. In Orissa, no jails have separate and exclusive accommodation for tuberculosis patients. Tuberculosis cases were, however, treated and isolated as far as possible in all district jails and in the two special sub-jails at Koraput and Russelkonda where separate hospital accommodation is available. Efforts are being made to concentrate all prisoners suffering from infectious diseases in the isolation ward of the Russelkonda special sub-jail. In Bengal, special wards for tuberculosis cases exist in Suri and Comilla jails, with accommodation for 43 and 30 beds respectively. Accommodation for tuberculosis patients is also available at Alipore central jail (eight beds), Dinajpur (eight beds) and Bogra jail (one bed). In C. P., Chhindwara jail has 22 beds. In Bombay Presidency, special provision exists in the central jails at Nasik Road (34 beds), Yeravda (eight beds) and Ahmedabad (six cells). In Sind, special provision exists in the central jail at Hyderabad (six beds and three cells) and Karachi district prison (six beds). In Madras Presidency, the Wellesley Sanatorium Jail, Bellary, with 160 beds, is set apart for treatment of tuberculosis patients. Provision also exists in the central jails at Bellary and Coimbatore and in the Presidency Jail for Women, Vellore (eight beds each), in the central jails at Vellore and Vizagapatam (four beds each) and in the central jail at Rajahmundry (two beds). In Assam all pulmonary tuberculosis cases are treated in Sylhet district jail where a special ward of 23 beds has been provided.

Borstal and juvenile institutions.

105. *N.-W. F. P.*—The Adolescent Training Centre at Haripur is intended for the concentration of casual adolescent and juvenile prisoners from all jails of the N.-W. F. P. Instruction is given in such subjects as agriculture, carpentry, blacksmith's work, tailoring, leather work, motor driving and mechanics. Physical training and games are also arranged. The "scout" movement has also become popular with the adolescent prisoners. Some of their activities during the year included participation in the Scouts Coronation Rally in May 1937, the filling of excavations made at Batrassi in the previous year in the search for water and the taking part in open events at the school sports, in the scouts sports.

Punjab.—The Borstal Institute in Lahore is still in actual fact a combination of a Borstal Institute under the Borstal Act and a "star jail" for adolescent offenders convicted under the Indian Penal Code. Some years ago, new buildings were erected, with separate main gate, hospital, etc., so that the two units might be kept more apart, but circumstances over which the Jail Department had no control and the necessity of segregating cerebrospinal fever patients and contacts have so far prevented the new section from being used for its proper purpose. The institution, therefore, continues to combine both functions. The average age of the inmates is 16—21 but boys of 15 are also sent there and a few long-term prisoners remain after reaching the age of 21 and are placed in a post-adolescent class. All inmates, whether Borstal or ordinary adolescents, receive the same treatment and training and the response is remarkably good even amongst habitual offenders. The physical fitness of the inmates is a matter which receives constant care. It is interesting to note that although the percentage of inmates entering the institution in a poor state of health rose from 17·3 per cent. in 1935 to 34·6 per cent. in 1937, the number of admissions to hospital during the same period went down from 1,004 to 681. Lectures on such subjects as rural reconstruction and sanitation were given regularly and instruction was also given by means of songs,

dramas and radio programmes. "Scouting" is an important feature of the training and there were 278 scouts in the institution during 1937. The industrial side also showed much progress both in respect of agriculture and factory work. Basket ball, football, volley-ball and scout games were played regularly. Matches with outside teams were also arranged and on these occasions the inmates made a creditable appearance, their fair play and lack of fouling being specially noticeable. One inmate became champion in the bantam weight Punjab Olympic wrestling competition and at the close of the year three of the Borstal basket ball team and one feather-weight wrestler were selected to represent the Punjab in the All-India Olympic games to be held at Calcutta.

The Borstal Section of the Female Jail in Lahore contained 25 girls, but none of these had been sentenced under the Act. They were kept separate from other convicts and given modified borstal training. Girl-guiding occupied a foremost place in their training.

United Provinces—Juvenile Jail School at Bareilly.—The school made good progress in education of the inmates and 218 juveniles attended various classes. In order to make the boys self-supporting after release, they are trained in useful industries. The play-ground was extended and the boys were able to play different games. In addition Indian games like *kabaddi*, races, etc., were introduced. Although there was no gymnastic instructor, the Superintendent took a personal interest in the boys and gave them lessons in gymnastics.

Other Juveniles.—Male habitual juvenile offenders up to 16 years of age were as usual confined in the Agra Central Prison, where they were given compulsory education. Their behaviour was good throughout. Other juveniles were as before concentrated in the Fatehgarh, Naini and Bareilly central prisons. The Lucknow central prison was closed for male juveniles as there were no arrangements there for education and reformation. Female juveniles were concentrated in the Lucknow central prison.

Bihar.—Admissions of youthful offenders and juveniles, i.e., all prisoners below the age of 20 years totalled 1,408. Excluding boys under the age of 15, who were sent to the Reformatory School at Hazaribagh, the rest of the prisoners were detained in the jails of the districts in which they were convicted or were transferred to the juvenile jail at Monghyr, to the Central jail at Bhagalpur or to the district jail at Bankipur. In the Juvenile Jail at Monghyr, all the juveniles were divided into two sections (i) those sentenced to less than one year were put in the maintenance department and employed on routine duties and (ii) those sentenced to one year or above were taken for Borstal treatment and were given educational, industrial and physical training.

Orissa.—Admissions of youthful offenders and juveniles, i.e., all prisoners below the age of 20 years, were 207 against 330 in 1936. Excluding boys under 15 years, who were sent to the Reformatory School at Hazaribagh in Bihar, the remainder were detained in the jails of the districts where they were convicted or were transferred to the juvenile jail at Monghyr in Bihar. The Government of Orissa had under consideration a proposal to convert the jail at Angul into a juvenile jail for the segregation there of all juvenile prisoners.

Bengal Presidency—The Borstal School, Bankura.—At the beginning of the year 312 boys were in the school against 362 in 1936. One hundred and seventeen were admitted and 166 were discharged, leaving a balance of 263 at the close of 1937. The general principles followed are those of the English Borstal system and every effort is made to reform these boys and return them to society

as healthy and useful citizens. The daily routine, so arranged that the boys are kept busy from morning till bed-time, comprises literary education, technical and industrial training and physical training. Regular physical exercises, wrestling and boxing are taught by a paid drill instructor. In addition, the boys were allowed to hold sports and participate in such games as football, hockey, cricket, basket ball, volley ball and different country games. They were also allowed to compete with outside teams. A recreation club has been planned inside the school and there the boys are allowed to enjoy various indoor games and music during their recreation hours. The Government sanctioned the formation of a permanent boy scout troop and the members are taken out for games and route marches.

Juvenile Jail, Berhampore.—The juvenile and adolescent prisoners are educated up to the lower primary standard, receive instruction in first-aid and hygiene and are given technical and industrial training. The boys are drilled in the morning and a paid teacher also gives training in folk dances and other Bratachari dances. They are also allowed to play country games and to have indoor games on Sundays and holidays.

Presidency Jail School.—The interest and keenness shown by the adolescent prisoners are reported to be encouraging. Physical drill is given daily.

Alipore Central Jail School.—The Alipore Central Jail School for juvenile and adolescent prisoners is conducted on the lines of the Borstal School as far as possible. The boys are given physical training for an hour each morning and arrangements also exist for parallel-bar and ground exercises in their ward.

Narsinghpur Borstal Institute.—In this institute the boys attend school and are also given vocational, industrial and physical training. Selected boys are trained in stretcher drill, first-aid and scouting. At the close of the year, 14 boys were in ambulance, 24 in scouting and four in motor-driving classes. Hockey, football and other games are played every evening, matches with local teams are also periodically arranged.

Bombay Presidency.—A scheme was under consideration for the provision of additional Borstal accommodation in the Dhulia district prison in addition to the existing Borstal School at Dharwar. As the population of the Borstal School at Dharywar did not increase, this scheme was dropped.

Borstal School, Dharwar.—Boys on admission are tested and placed in different classes. Literate boys are exempted from school as higher education cannot be carried out and they are better employed on vocational training. Apart from industrial training physical training forms an important rôle in the daily routine. All forms of sport and recreation are carried on with enthusiasm. Annual sports were held and cups and medals were presented to the winners. A second troop of scouts was formed and 25 boys were trained in first-aid. In the examination 21 were successful and obtained certificates from the St. John Ambulance Association.

Madras Presidency.—Training in ambulance and first-aid continued to be effectively carried out. Six hundred and thirty-six convicts and Borstal inmates were trained during the year in addition to those under training at the end of the previous year. Five hundred and seventy were discharged and 217 continued to be under training at the end of 1937. Forty-four obtained first-aid certificates in the examination held by the Medical Department.

Andamans.

106. The figures relating to the jail population of the Andamans have been dealt with in two parts (1) those relating to the cellular jail and associated barracks and (2) those relating to *talabdars* and self-supporting convicts outside cellular jail.

Cellular Jail and Associated Barracks.—The total accommodation available in the cellular jail and associated barracks during the year 1937 was for 1,062 persons, excluding four cells for condemned prisoners. The daily average strength was 635 so that there was no evidence of overcrowding. The population at the end of 1937 was 471 males; there were no female convicts. The daily average sick rate calculated per thousand of the daily average strength was 42·2. The total number of hospital admissions during the year was 765, giving an admission rate of 1,205 *per mille* of the average strength. Deaths numbered two giving a rate of 3·1 *per mille* of the average strength. One hundred and sixteen admissions were due to malaria, 90 to dyspepsia, 61 to influenza, 12 to dysentery, 10 to diarrhoea, four to tuberculosis of the lungs and 26 to other respiratory diseases. Most of the malaria cases were amongst recently convicted local convicts or new arrivals from India. There were no admissions for cholera, smallpox, plague or Weil's disease.

The general health of the inmates of the cellular jail was reported to be satisfactory.

A mass hunger strike by terrorist prisoners confined in the cellular jails commenced on 23rd July, 1937. Great care was taken to maintain the health of these prisoners, artificial feeding being resorted to, and all possible precautions were taken to prevent outbreaks of any epidemic disease such as dysentery or diarrhoea. The hunger strike lasted for 55 days, the maximum number taking part at the same time being 232. No death or accident occurred amongst these prisoners while they were being artificially fed.

Talabdars and self-supporting convicts outside cellular jail.—In the settlement, the barracks and cells allowing 50 superficial feet per prisoner had accommodation for a total of 3,801 persons. Talabdars using this accommodation numbered 2,622, so that there was no overcrowding.

The average number of daily sick for the year under review (139·98) compares favourably with the average figure for the previous four years (163·14). The daily average sick rate calculated per thousand of the average strength was 25 *per mille* as against a rate of 28 *per mille* for the past four years.

The total number of admissions to hospital was 3,601 or 634 *per mille* of the average strength as against 2,909 in 1936 and 2,922, the average for the last four years. Of this total, 1,438 admissions were for malaria, 122 for dysentery, 52 for Weil's disease, 148 for respiratory diseases excluding tuberculosis of the lungs and pneumonia, 12 for pneumonia, nine for tuberculosis of the lungs, 42 for diarrhoea, 31 for influenza, nine for enteric fevers, 63 for anæmia and 12 for debility. Cholera, smallpox and plague were absent as in the previous year.

The number of deaths from all causes was 58 in 1937 as against 67 in 1936. These deaths included four from dysentery, 15 from Weil's disease, one from enteric fever, five from malaria, four from anæmia, three from tuberculosis of the lungs, two from pneumonia and two from respiratory diseases.

The incidence of malaria rose from 688 cases in 1936 to 1,438 in 1937, although the deaths only rose from three to five.

A comparative statement of malaria incidence and mortality for the quinquennium ending 1937 is given below. As separate figures for malaria among the inmates of cellular jails and associated barracks and among those living outside were kept only during 1936 and 1937, the following figures are inclusive of all classes of prisoners in the Andamans Settlement.

Year.	Malaria.		
	Admissions.	Deaths.	Percentage of deaths to admissions.
1933	1,621	16	0.99
1934	1,497	9	0.60
1935	1,353	7	0.52
1936	723	3	0.41
1937	1,554	5	0.32

It will be seen that during 1937 the mortality per cent. of admissions was the lowest recorded. One of the factors accounting for this low mortality is that strict supervision and control, both medical and otherwise, were maintained over men living in temporary huts and employed on clearing jungle and digging drains, etc.

The recorded rise in the number of admissions from malaria is reported to have been due to (a) more men working on and living in the areas near reclaimed land and brackish water in the recently opened stations; (b) infection of forest camps, the disease having been brought during 1935-36 from India by Ranchi labourers and thereafter having spread to convicts; (c) the opening up of new villages near the reclaimed areas and a decrease in the number of convicts available for labour in the Settlement. This made it impossible to adhere strictly to the recommendation of the Senior Medical Officer that recently arrived convicts should not be sent to malarious areas, and (d) a rise in the number of cases of relapses as a result of less strict supervision over infected cases following the diversion of the medical staff to the care of the hunger-strikers, who struck at the height of the malaria season.

In view of the high incidence of malaria during the present year, a recently opened married *talabdar* village, which had a high malaria rate, was abolished after a couple of months' trial.

Admissions and deaths from Weil's disease for the past five years are given below :—

Year.	Admissions.	Deaths.
1933	36	8
1934	29	5
1935	13	3
1936	57	16
1937	52	14

It will be seen that during 1937 a decrease occurred in the number of admissions from this disease. Of the total, 16 cases occurred amongst self-supporting prisoners, mostly cultivators. The first case occurred in June, 1937, and the largest number of admissions occurred during early September. Specially prepared anti-leptospira human serum of Andamans-strain, obtained from Messrs. Burroughes Wellcome and Co., London, was used with fair success.

In last year's report mention was made of certain prophylactic measures including provision of abundant warm water and soap for washing the hands and feet on return from road-making and the application of tincture of iodine to abrasions, and it was reported that where these measures were adopted, the disease quickly subsided. During 1937, the same measures were applied

in the same station. The result was that the total number of cases of Weil's disease in Ograbaraij fell to eight, with two deaths, as compared with 12 cases with six deaths in the previous year. The same measures were also adopted in another area where road-making was commenced during the period of the year when Weil's disease is prevalent in the Andamans. No cases occurred although at one time this area was very badly infected.

Five hundred and twenty-eight major and minor operations were performed. The total number of radiograms taken was 181; of these 90 were for medico-legal and accidental injuries, 35 for diseases of the lungs, 10 for diseases of bones and 36 for teeth. A total of 485 vaccination operations against smallpox was performed.

The working of the bacteriological laboratory continued to be satisfactory. The following examinations were carried out :—

5,780 blood slides, 427 specimens of sputum, 815 of urine, 558 for Wassermann Reaction, 328 for Kahn's test, 26 for Widal's test, 55 for Fontana's stain, 1,386 specimens of faeces and 21 for blood grouping.

Conclusion.

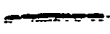
107. The health of the general jail population in British India was satisfactory during the year. Excluding the Andamans, the death rate from all causes decreased from 11 *per mille* in 1936 to 10 *per mille* in 1937; the constantly sick rate also showed a slight reduction from 23 to 22. As regards specific diseases, influenza, malaria, tuberculosis of the lungs, pneumonia, dysentery and diarrhoea, all showed appreciable decreases in incidence. Reduction in the incidence of malaria occurred in almost every province, but an outstanding exception was Sind. As regards the Andamans, the convict population has been divided into two groups (1) those confined in cellular jails and associated barracks and (2) *talabdars* and self-supporting convicts. The death rates among these two classes were 3.1 *per mille* and 10.2 *per mille* respectively, the combined rate being 9.5 *per mille*. Corresponding figures in 1936 were nil, 12 *per mille* and 10 *per mille*.

The general level of health administration in Indian jails may be judged by making comparisons of the rates of admission to hospital and of the death rates, in and out of hospital, for prisoners over a period of years. The figures for the period from 1921 to 1937 are given below :—

District and Central Jails.

Year.	Admission rates.	Death rates.
1921	777	21
1922	784	22
1923	689	15
1924	696	15
1925	597	13
1926	565	13
1927	541	12
1928	502	11
1929	537	12
1930	627	11
1931	654	13
1932	649	11
1933	614	11
1934	602	13
1935	555	11
1936	540	11
1937	493	10

It is obvious that amongst jail populations a more or less continuous decrease has occurred both in hospital admission rates and death rates since 1921. The admission rate has fallen by about 37 per cent. and the death rate by more than 50 per cent. between 1921 and 1937. These reductions within a period of sixteen years bear testimony to a record of increasing efficiency in the health administration of Indian jails.



SECTION X.

VOLUNTARY ORGANISATIONS.

Introduction.

108. Voluntary effort can play an important part in the field of public health endeavour. In the words of Huxley, "We live in a world which is full of misery and ignorance and the plain duty of each and all of us is to try to make the little corner he can influence somewhat less miserable and less ignorant than it was before he entered it." Improvement of public health requires not only the provision of those environmental conditions which are essential for healthy living but also the active and enlightened co-operation of the people in the pursuit of health. Both in respect of education of the people and of provision of social amenities, voluntary effort should always be ready to supplement the work of Governments, if satisfactory and lasting progress is to be made.

In India, voluntary organisations interested in public health are mostly provincial or local societies. All-India organisations are few but include the Indian Red Cross Society, with which is incorporated the Junior Red Cross, King George Thanksgiving Anti-Tuberculosis Fund, the St. John Ambulance Association (Indian Council), the British Empire Leprosy Relief Association and the Mission to Lepers. The activities of some of these as well as a few of the more important provincial organisations are briefly described in this section. In a vast country such as India, with its large rural population spread over hundreds of thousands of villages, the work of local voluntary societies is particularly desirable, because through them the message of health is likely to be carried to the homes of the people. Moreover, the problems of health are closely interwoven with every aspect of rural community life,—social, economic and educational,—and voluntary work in these fields, in so far as it is able to develop a spirit of co-operation for furtherance of the common good, should go far to create conditions favourable to national health betterment. Control of epidemic disease, maintenance of the purity of village water supplies, improvement of agricultural and animal husbandry practices, provision of social amenities, such as play grounds, places of amusement and common places for worship, these and similar objects can be achieved on an enduring basis only by means of co-operation of the people and never through compulsion or pressure from outside.

Indian Red Cross Society.*

109. The international work of the Red Cross Society expanded considerably during 1937. The continuance of the civil war in Spain, the Sino-Japanese conflict which broke out in July and the Waziristan campaign on the borders of India, all called for additional Red Cross activity. Since the beginning of the Spanish war, the Indian Red Cross Society contributed a sum of Rs. 16,210 for Spanish relief whilst, in respect of China, Rs. 1,000 was sent to Geneva towards the expenses of the international delegation to China and Rs. 1,000 to China in the form of drugs for medical relief to all nationalities. An appeal was issued to all Red Cross branches in India and by the end of the year a sum of Rs. 1,375 was received. In addition to monetary help, the Red Cross continued its activities on behalf of the sick, wounded and prisoners of war.

* Prepared from a note supplied by the Organising Secretary, Indian Red Cross Society.

The Society was represented at (1) the Empire Conference on the Care and Aftercare of the Tuberculous in London in May; (2) the Seventh English Speaking Maternity and Childwelfare Conference in London; and (3) the Regional Junior Red Cross Conference for the Far Eastern Countries in Tokyo. In addition the Society supplied material for the Health Exhibition organised in connection with the League of Nations' Rural Hygiene Conference at Java and a report on the work done, under the Junior Red Cross, for prevention of blindness was sent to the delegate of the Government of India at the International Ophthalmological Congress at Cairo.

The Society continued to co-operate with the Trained Nurses' Association of India in the work of the Indian Committee of the Florence Nightingale International Foundation and the annual scholarship donated by the Society for the international post graduate courses was given to an Indian nurse.

Steps were taken for the separation of the Burma Branch and for the formation of a separate Burma Red Cross Society.

MATERNITY AND CHILDWELFARE BUREAU.

The Maternity and Child Welfare Bureau Committee was strengthened and made more representative by the co-option of four Indian ladies and of Dr. Ruth Young, the first Director of the Bureau. The Director of the Bureau was asked to serve on (i) the Central Advisory Board of Health *ad hoc* committee appointed to report on maternity and child welfare work in India and (ii) an advisory committee on maternal mortality and morbidity under the auspices of the Indian Research Fund Association.

The number of civil welfare centres in India is not accurately known, but they total approximately 800, some 250 of which are run or aided by branches of the Indian Red Cross Society.

The number of Health Schools in India during 1937 was seven; four of these, the Lady Reading Health School in Delhi, the Madras Health School, the Seva Sadan Health School in Poona and the Bengal Health School received financial aid from the Bureau. Other training institutions aided from the Lady Chelmsford League Fund were the School of Mothercraft, Bareilly, and the Mysore nursery school and training centre for teachers. The most important event of the year was the reopening of the Bengal Health School. A notable advance of the Lady Reading Health School was the recognition of its diploma by the Government of India.

The most interesting feature of the work under the Victoria Memorial Scholarship Fund is the continued demand for grants for *dais'* training schemes. The number of Victoria Memorial Scholarship certificates issued in 1937 was 119.

The total sum available for army child welfare in 1937 was Rs. 26,090. The announcement of an increase in the Army Headquarters grant for 1938 from Rs. 5,000 to Rs. 10,000 was an encouraging and welcome recognition of the good work done. Grants were given to 45 Indian and 13 British stations.

KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND.

This fund continued to be administered by a sub-committee of the Red Cross Society. Dr. B. K. Sikand, M.B., D.P.H., succeeded Dr. A. R. Mehta as Organising Secretary.

The outstanding event of the year was the appeal issued by Her Excellency the Marchioness of Linlithgow in December for the King Emperor's Anti-Tuberculosis Fund. His Majesty the King Emperor graciously allowed

his name to be associated with the appeal and Their Majesties personally contributed to the fund. The intention is to constitute an anti-tuberculosis organisation for India on a larger scale than has hitherto been possible and eventually to incorporate the "King George Thanksgiving Fund" in the new organisation. The Indian Red Cross Society contributed a sum of Rs. 5,000.

The chief activities of the King George Thanksgiving Fund during the year were the organisation of postgraduate courses for tuberculosis workers at Calcutta, Madras and Bombay, the issue of a "Special Tuberculosis Number" of the Indian Medical Gazette and the collection of information regarding existing anti-tuberculosis institutions in India.

The Hasan Masud Suhrawardy Anti-tuberculosis Challenge Shield for the best anti-tuberculosis campaign was awarded to the Tuberculosis Association of Bengal.

JUNIOR RED CROSS.

With the Silver Jubilee grants received last year, the headquarters of the Junior Red Cross were able to employ a half-time Director; Captain M. Hafizuddin, L.R.C.P., M.R.C.S., succeeded Dr. B. K. Sikand in that post.

The Junior Red Cross movement continued to spread and a noticeable improvement was evident in the quality of the work in some provinces, particularly in Madras and Sind.

An essay competition on "Food and Health" was organised by Headquarters and 55 essays were received.

Special emphasis was placed on improvement in nutrition. Headquarters issued posters, slides and a special pamphlet entitled "A Guide to a Well-Balanced Diet". This last has met with a good reception.

The campaign for prevention of blindness continued vigorously and the grant made by the National Institute for the Blind, London, made possible the holding of classes.

Another activity which occupied the attention of a large number of juniors is village improvement. Many provincial reports mentioned the work done in cleaning up villages and in spreading knowledge of hygiene among the villagers.

Cinema Section.—During 1937, two new films were released, i.e., "Self Help in the Village" dealing with rural improvement and "The Training of Hira Dai" dealing with better midwifery. Thirteen copies of films were prepared for sale or circulation. The demand for library films rose from 160 in 1934 to 375 in 1937. In addition to film work, the staff prepared 3,726 lantern slides and a large number of still photographs for publicity purposes.

Propaganda and publicity.—The Red Cross Journal appeared as a bi-monthly with the usual pictorial and Junior Red Cross supplements.

Special attention was given to wireless propaganda. In addition to occasional talks by the Organising Secretary and other members of the staff, the Publicity Officer prepared regular health talks for villagers usually in the form of dialogues. These were broadcast from Bombay, Calcutta, Delhi, Mysore and Peshawar stations.

A new set of four nutrition posters was prepared and issued in English, Urdu, and Hindi. A pamphlet entitled "A guide to a well-balanced diet" and a set of 24 slides on "Food and Nutrition" were added to the propaganda material.

The demand for lantern slides, posters and pamphlets, as well as for Red Cross flags and propaganda material was satisfactory and Junior Red Cross issues showed a considerable increase over the previous year.

Emergency relief.—In July, one of the worst railway disasters in the history of India occurred at Bihta, near Patna, when about 100 persons were killed and nearly 200 injured. The Society immediately offered its help and within a day or two 10 nurses were mobilized and remained on duty for varying periods up to one month.

Assistance to invalided ex-soldiers.—From the Fund placed at the disposal of the Society by the Joint War Finance Committee, London, five invalid cases among European *ex-officers* and soldiers were assisted. Indian *ex-service* cases were assisted as before through the Soldiers' Boards. The U. P. Branch paid for the treatment of 11 *ex-soldiers* suffering from tuberculosis at the Bhowali Sanatorium.

British Empire Leprosy Relief Association (Indian Council.)*

110. The British Empire Leprosy Relief Association (Indian Council) continued its anti-leprosy work by means of scientific research, by educational propaganda, by epidemiological studies of the disease and its aetiological factors, by the training of doctors and by the development of treatment clinics.

Division of work between headquarters and the provincial branches followed the same lines as in previous years ; research, propaganda and the training of doctors, items which benefit the country as a whole, have been in the charge of headquarters, whilst the actual treatment of patients and other activities of a local nature were left to the care of provincial branches. The research work carried out during the year has been summarised in the paragraph on leprosy in Section II (page 60).

Propaganda.—The Propaganda Officer visited leprosy institutions in the Punjab, United Provinces, Bombay, Orissa and some States in Central India and Rajputana and did useful propaganda work in addition to conducting sample surveys and advising the local authorities as to the lines along which anti-leprosy campaigns should be conducted. The quarterly Journal 'Leprosy in India' published by the Association continued to serve a useful purpose.

Field work.—The leprosy investigation work in Bankura in Bengal was continued in collaboration with the Bengal Branch, to which a grant of Rs. 2,000 was made from headquarters. The possibility of starting intensive experimental work on similar lines in one or more rural areas in Madras Presidency was also examined.

Training of doctors.—In addition to the courses of lectures given by Dr. Lowe to the D.T.M., L.T.M. and D.P.H. classes at the School of Tropical Medicine, Calcutta, a special course in the diagnosis and treatment of leprosy was held at Calcutta in November, at which 22 doctors from India and one from East Africa received instruction. Two courses were held, under the auspices of the Association, at Dichpali Leper Hospital in Hyderabad State, for the benefit of the final year medical students of Osmania University and officers of the State Medical Department. Four courses were also held by Dr. Cochrane at the Lady Willingdon Leper Settlement, Tirumani, in Madras Presidency.

* Prepared from a note supplied by the Honorary Secretary, British Empire Leprosy Relief Association.

Provincial activities.—During the year a new branch of the association was formed in the province of Orissa, and the Madras and Bombay provincial branches were re-constituted along the lines advocated in the "Memorandum on provincial branches" issued by the Indian Council of the Association. All the 18 branches in British India and States did useful anti-leprosy work commensurate with their financial resources.

The Mission to Lepers.

111. The object of the Society 'Mission to Lepers' is to provide for the spiritual instruction and temporal relief of lepers and the children of lepers in India and such other countries to which its operations have been or may be extended from time to time and in so far as lies in its power, to assist in bringing about the extinction of leprosy. Thirty-five leper homes were entirely maintained by the Mission, whilst financial aid was given to 14 homes maintained by other organisations. The Mission, through amounts raised by subscriptions from private bodies and from Government or local board grants, spent Rs. 8,12,209 in India and Burma during 1937. At the end of the year, 7,544 patients were residing in the Mission's Homes spread over a number of provinces in India; 2,080 patients and 152 healthy children in other Homes, not belonging to the Mission, were given substantial financial aid and 10,444 leper out-patients received medical treatment. Out of a total of 7,432 inmates under treatment in the Mission's homes, as many as 2,520 showed much improvement and 2,605 improved slightly. Most of the Mission's institutions have resident medical officers, but a few of the smaller institutions rely on periodical visits of outside medical men.

The International Health Division of the Rockefeller Foundation.*

112. All activities reported in 1936 have been continued and some additional work has been undertaken. The Najafgarh Health Unit, Delhi Province, was started in April; a malaria survey was carried out at Poona from February to August; and a new malaria field station was opened at Ennore.

Madras Presidency.—The malaria research work at the King Institute of Preventive Medicine, Madras, and at the Pattukottai Field Station in Tanjore District was continued. Another field station at Ennore was opened in August to study malaria in casuarina plantations. A malaria engineer belonging to the staff of the Rockefeller Foundation joined the research work in December.

Co-operation with the Government of Madras in the work of the rural health unit at Poonamallee was continued for the third year. The full staff carried out a full programme. During the last quarter, one midwife whose appointment was made necessary by the increasing demand for this type of service was added to the staff. This unit has made considerable advances in maternal and infant work.

Mysore State.—The rural malaria control scheme at Mandya and the malaria observation stations at Hiriya and Nagenhalli were maintained by the Government. Researches on the *A. Stephensi* mosquito were carried out and several articles on the subject were sent to the press.

Assistance to the Closepet Health Unit was given for the second year. A complete staff of health visitors, midwives and sanitary inspectors, have been secured and all health unit activities are now being carried out. The people of the area are co-operating satisfactorily and several village health leagues.

* Prepared from a note kindly supplied by Dr. W. P. Jacocks of the Rockefeller Foundation.

are working well. The early start along these lines should enable the unit to make rapid progress in sanitation. General advisory assistance in all health matters was rendered to the State for the 12th year.

Travancore State.—Co-operation with the Travancore Government in the rural health unit at Neyyattinkara ceased on August 16, 1937, after five years of joint effort. The health unit is now being carried on by Government at its own expense. Advisory assistance to the public health department in general health matters was continued for the 10th year.

United Provinces.—The Partabgarh Health Unit completed its fifth year of co-operation. Due to unusual circumstances, financial assistance has been given for a sixth year. During the past twelve months, the activities of the unit have reached their former stage of usefulness after a two-year period of unsatisfactory work due to unavoidable local causes. Of special interest is the development of health leagues. This health unit has made the greatest recorded advance in health league activity in India.

Delhi Province.—In April the first health unit was started at Najafgarh in Delhi Province, 15 miles west of Delhi. Much of the time during the year was devoted to training workers and getting them settled in their respective territories. At the end of the year a full staff had been selected and the general environmental survey was in progress. The malaria survey had been completed and a nutrition survey was begun by a trained nutrition field worker.

Bombay Presidency.—Two Foundation officers who specialised in malaria undertook studies at Poona from February to August. It is regretted that these officers could not remain longer in India. Most of the work was done during the dry season. A malaria survey was carried out in the urban area of Poona and in certain adjoining rural areas including altogether 16 localities. The only mosquito found infected in nature was *A. culicifacies* and this was one of the three (*A. culicifacies*, *A. subpictus* and *A. fluviatilis*) in which the stomach blood was human-positive when subjected to the precipitin test. During the period, eight officers from various parts of India were sent to Poona to be made familiar with the precipitin and other technical methods. A report on this work appeared in the 'Records of the Malaria Survey of India,' for March, 1938.

Fellowships.—Fellowships were given to six candidates for advanced study in public health subjects in foreign countries and in India and three travel grants were awarded to members of the superior staff to visit health work in Europe and Ceylon. Five fellows returned to India after completing their studies abroad.

The Bombay Presidency Baby and Health Week Association.

113. The Association helped 148 centres during the year under review. Of these, 113 centres took advantages of the Association's cinema unit and arranged a series of cinema demonstrations. Full sets of models, cinema and magic lantern units and health literature were sent to 35 health exhibitions including the Food and Vitamins Exhibition held in Bombay city. A complete set of posters in English was sent to Java for the Inter-governmental Conference of Far Eastern Countries on Rural Hygiene. Forty-three magic lantern lectures were arranged by the Association in the rural areas of Poona and Satara districts. Abstracts of reports received by the Honorary Secretary of the Association from the centres showed that nearly 609,000 persons of all castes and

creeds attended the functions and 1,561 reels of cinema films on public health and child welfare topics were projected. The Association continued its research work on cheap balanced diets.

Other Organisations in Bombay Presidency engaged in public health education included (1) the Breach Sanitary Association, (2) the Ahmedabad Sanitary Association, (3) the Arogya Mandal at Dhulia and (4) the Bombay Presidency Infant Welfare Society. The last institution is also stated to have done welfare work in connection with antenatal care of pregnant women, antivenereal treatment, maternity and infant welfare and creches.

Karachi Health Association.

114. The Association employed two qualified lady doctors. During the year 1,819 cases attended the ante natal clinic and the lady health visitors and midwives of the Association visited 1,318 ante natal cases. A total of 1,015 cases was conducted at the Karachi Health Association maternity home; of these, 617 were normal cases and the others abnormal in one way or another. The outdoor midwives conducted 1,517 cases.

Health Propaganda Board, Madras.

115. The objects of this Board were explained in last year's report. The Board carried out propaganda by arranging health exhibitions, by providing models and posters dealing with various health subjects, such as tuberculosis, hookworm, leprosy, malnutrition, bore-hole latrines, smallpox, etc. and by publishing pamphlets on matters dealing with public health. The Board also made a number of practical suggestions to the Public Health Minister in Madras in respect of the proposed Public Health Act for Madras Presidency.

SECTION XI.

MISCELLANEOUS.

Prevention of Blindness.

116. In last year's report brief mention was made of the subject of prevention of blindness ; the important causes leading to blindness were pointed out ; and the suggestion was made that there was justification for greater governmental and voluntary effort in this field of preventive work. Whilst the census report of 1931 gave the number of totally blind persons in this country as a little over 601,000, or approximately 1.7 per 1,000 inhabitants, surveys since carried out by trained investigators in limited areas in different parts of the country indicate that this figure is certainly a serious under-estimate of actual conditions. In the Nasik district of Bombay Presidency, for instance, a survey has revealed the number of the blind as 4.4 per 1,000 of the population as against the census figure of 1.74 *per mille* ; in Bijapur the figure was 2.6 as against 0.7 ; and in Ratnagiri 1.5 as against 0.7 *per mille*. The report for 1937-38 of the " Bengal Association for the Prevention of Blindness " also quotes the results of sample surveys carried out in two villages of Kishoreganj sub-division of Eastern Bengal ; there the incidence is stated to be 9.0 per 1,000 inhabitants. Whilst caution must be exercised in applying figures obtained in limited areas to the country as a whole, available evidence justifies the conclusion that the census figure must be multiplied two or three times before an approximation to the correct position can be reached. It seems, therefore, to be no exaggeration to state that blind persons in India number something approaching one and a half millions.

Even the defective figures available from the census enumeration make it clear that the distribution of blindness in India is by no means uniform. " It is more prevalent in Rajputana, the Punjab and the United Provinces, which respectively have 386, 245 and 291 per 100,000 than in the greener, shadier and less windy and dusty provinces of Assam, Madras (especially the fertile East Godavari, Tanjore and South Kanara districts) and Bengal, which have an incidence of only 97, 87 and 72 per 100,000." Further, the influence of occupation is revealed by the fact that, whilst its incidence is high among cobblers, tailors and workers in tin and lead, agriculturists and open-air workers relatively suffer to a much less extent.

That a large proportion of the blindness in India is preventable is indicated by the fact that in Egypt, where a continuous campaign has been in progress for several years, " the rate of the blind has declined from 15 per cent. in 1919 to six per cent. in 1935." As was pointed out in last year's report, the preventive campaign against blindness comprises not only organised medical relief but an improved standard in the social and economic life of the community. In order to attack these problems effectively, governmental action and voluntary effort must supplement each other ; neither can succeed without the other's co-operation.

The general campaign for improving the health of the people will undoubtedly have a salutary effect on the blindness problem. For instance, suitable measures against smallpox and venereal diseases will result in the saving of many eyes from complete destruction and a still larger number of persons from permanent defects of vision. It has been reported that " 26 per cent. of the incurably blind in Russia owe their blindness to smallpox ", whilst in

China the proportion is said to be as high as 35 per cent. In India, the corresponding recorded rate is 3.75 per cent. and this comparatively low figure may be claimed to be the result of the campaign of vaccination enforced in this country during the past seven or eight decades. In respect of venereal diseases, infection of the infant's eyes with the germ of gonorrhoea from the genital tract of the mother at the time of birth is a common source of blindness. Whilst no figures for India are available, in England, where ophthalmia neonatorum is a notifiable disease, 8.5 cases per 1,000 births were reported in 1936. It may be assumed that the incidence of gonorrhoea in India is equally high and that many infants are doomed to lose their eyesight at the beginning of their lives, since particularly in rural areas no organised preventive service exists.

Reduction in the incidence of syphilis will also result in the prevention of much blindness. If the estimate made in 1933 by Sir John Megaw is even approximately correct, "10 to 15 per cent. of the inhabitants suffer from syphilis at one time or other during their life time." These percentages represent large figures and, although administrative, financial and other difficulties may stand in the way of a comprehensive national campaign against the ravages of syphilis, the experience of the intensive anti-syphilitic programme carried out in England since the Great War points to the possibilities of improvement to be effected by instruction in preventive methods and by adequate provision for treatment.

Trachoma is yet another important and common eye disease in this country, particularly in certain areas of North-Western India. Such details as are available of its incidence in different parts of India have been already included in Section II of this report (page 73). Here again, the most advantageous lines of attack are the provision of greater facilities for treatment and the inculcation of hygienic habits in order to reduce the danger of transference of infection from one person to another.

"Blindness is the scourge of poor countries and one must think twice before starting a movement which will involve much expense if one wishes to obtain the maximum results." These words, quoted from a recent issue of the *Journal of the International Association for Blindness*, are particularly applicable to any national preventive campaign in this country. The difficulties of such a campaign are both numerous and complex. The scattered nature of rural villages, the general ignorance of preventive methods, the widespread practice of quackery and the inadequacy of trained medical assistance are all problems admitting of no easy solution. The field is one in which voluntary organisations will find abundant scope and it is suggested that their first effort should be towards the augmentation of the services provided by Governments. In this connection, it is of interest to note what has been accomplished for ophthalmic relief in Egypt, a country which like India suffers severely from preventable eye diseases.

"The excellent system of ophthalmic relief now prevailing in Egypt was started in 1903 by the gift of a sum of £41,000 placed at the disposal of the British Agent by Sir Ernest Cassel for that purpose. Thus arose the Ophthalmic Section of the Public Health Department under a Director of Ophthalmic Hospitals. To begin with, it was decided to establish a travelling hospital to tour round the country districts, remaining six months in each place. A Director of Ophthalmic Hospitals was appointed to administer this and other means of relief. The hospitals became a definite branch of the Egyptian Government Service in 1906. The scheme subsequently greatly developed, the cost being borne partly by Government grants, partly by subscriptions and gifts."

“ Between 1904 and 1914 sixteen ophthalmic hospitals were opened in various parts of Egypt ; the permanent hospitals were reinforced by travelling hospitals which are an important part of this system.” The report for 1912 says :—“ To the popularity of these hospitals, the need for ophthalmic relief, after countless generations of suffering and disability, is becoming felt by the people of Egypt, a need which was not realised until the establishment in 1904 of the first hospital.”

“ The system has continued to develop and in 1927 Egypt was spending Rs. 9½ lakhs a year in ophthalmic work, contributed by Government, the local bodies and the charitable public.”

A recent report, submitted to the Fifteenth International Ophthalmological Congress held in Cairo last year, indicates that even further progress has been made. “ There are actually 73 ophthalmic units ; 29 permanent hospitals ; 14 travelling clinics and 30 sections in the general hospitals. Moreover 35 ophthalmic clinics have been created in connection with Government primary schools.” The effect of this progressive campaign has been the remarkable reduction in the rate of the blind from 15 per cent in 1919 to six per cent in 1935.

The entire population of Egypt numbers about 14 millions, a figure considerably less than that of any of the major provinces of this country. And yet the facilities provided for treatment are greatly in excess of those in Madras Presidency which “ is by far the best supplied with hospitals in which special ophthalmic relief can be had and (where) trained assistants can be obtained within easy reach of all areas of the Presidency.” The results obtained in Egypt have only been made possible by combined governmental and voluntary effort and if only the educated sections of the community in India could be brought to realise the enormous amount of suffering and economic loss which is caused by eye diseases and their after-effects, there seems no reason why similar results should not be achieved here.

As far as available information goes, few provinces can boast of any special organisation for the prevention of blindness. It is, therefore, all the more interesting to take note of what has been accomplished in Bengal through the “ Association for the Prevention of Blindness ” in that province. This Association came into being only in 1930 and, as the report for 1937-38 makes clear, it already possesses an admirable record of work. In the first place, it maintains two travelling dispensaries which have done much more than carry a message of hope to hundreds of sufferers in distant villages. In Eastern Bengal, where a large part of the country is under water during the rainy season, a boat has been equipped to take the place of a motor ambulance. In dry weather the dispensaries move by rail and by country carts. “ The medical officers of these dispensaries carried out propaganda work in the prevention of blindness and care of the eyes by means of lantern lectures, demonstrations, cinemas, posters, pamphlets, etc. These medical officers are fully trained eye specialists and, in addition, carried out curative work in restoring sight to the blind. Operative work was carried out in the sub-divisional hospitals or in buildings improvised as hospitals.” Each travelling dispensary halts in one centre for a period of about three months at a time and its advantages have been so much appreciated that regular appeals are made by the people for extension of this period. Because of lack of funds, these appeals have had to be reluctantly refused, unless when the people themselves have raised subscriptions sufficient to maintain the dispensary for a further period. The need is evident and could

be met, if only the Association were given more adequate financial support. It is also worth noting that the scientific aspects of the problem have not been neglected. Sample surveys have been conducted in order to obtain more accurate figures in respect of the incidence of blindness and to ascertain the causes producing this terrible affliction. These surveys are bound to provide in time information which will be a valuable guide in the planning of future preventive work.

Similar efforts are urgently required in many different parts of India and the task is so immense that voluntary agencies will find abundant opportunity in this field for all the money and personnel they can raise for the purpose. The work of the travelling dispensaries in Bengal has shown that infectious conditions like trachoma are widespread. In such conditions, education of the people in methods of prevention is just as important as the provision of medical treatment. Once the advantages of scientific treatment are appreciated, the people will be more open to instruction in respect of prevention, but here the educated section of the community, the village headman, the school-master, etc., must all lend a helping hand if permanent results are to be achieved.

Yellow Fever.

117. The yellow fever position, in so far as it affects India, was briefly discussed in the report for 1935. New additions to our knowledge of the epidemiology of that disease, the great development of air traffic and the certainty that still wider developments will be made in the near future seem to justify some description of recent events and of the precautions now being taken against the introduction of this infection.

A welcome feature of more recent times has been the wider recognition of the danger of the spread of yellow fever to countries hitherto free from that disease. This change of outlook may be attributed in great part to the attitude adopted by India's delegates at international conferences where this question was under discussion and it is satisfactory to note that there is now general agreement with the point of view which has been consistently held by the Government of India. Civil aviation departments and air companies in general, after a readily understandable hesitation, have now come to a fuller appreciation of the dangers to public health implicit in rapid air transport. These organisations are, therefore, now working in friendly co-operation with public health departments in every part of the world in the effort to prevent the spread of disease by infected persons and insects. The Rockefeller Foundation has once more placed the whole world under a deep debt of gratitude by its magnificent work not only in respect of extension of our knowledge of the epidemiology of yellow fever but also in organising systematic preventive campaigns in endemic areas.

Some of the new facts which have come to light in recent years are of great interest and importance. For instance, it has been possible to produce in monkeys (*Macacuscus rhesus*) the signs and symptoms of human cases and so to make an intensive study of the disease in experimental animals. It has also been proved that microscopic sections of the liver tissue of a yellow fever case present characteristic signs by which a diagnosis can be made; by means of a simple instrument known as the viscerotome portions of liver tissue can be obtained without carrying out a detailed postmortem. Further it is now possible by the elaboration of what is called the "mouse protection test" to

determine whether or not any given person has previously had an attack of yellow fever. The extended application of the mouse protection test, using the sera of persons living in suspected regions, has made it possible to map out the boundaries of endemic areas and of what are known as 'silent' areas.

Finally, experimentation over a period of years has resulted in the elaboration of a technique which permits of the production of a potent protective vaccine, one which in its latest form does not give rise to the jaundice and other toxic symptoms occasionally produced by the earlier types of vaccine.

From field and laboratory studies in America and Africa, our ideas of the epidemiology of yellow fever have undergone a remarkable transformation. Yellow fever was until recently believed to be solely an urban and coastal disease, its incidence being thought to be dependent on the presence of the stegomyia mosquito (*Aedes aegypti*) which was the only known transmitting agent. The disease was diagnosed from what was assumed to be a classical syndrome, and the absence of typical cases was interpreted as meaning freedom from infection. Studies of liver sections taken from all persons dying from fevers of over 10 days' duration and the application of mouse protection tests have, however, established that "definite and recognised clinical cases only form a very small proportion of the cases of yellow fever" occurring in an endemic area. It is the mild unrecognised cases which keep infection going and, because they frequently remain undetected, they constitute a grave danger in respect of spread of the disease.

In South America, the urban and coastal type of the disease was that which for many years was the object of vigorous preventive measures. Within more recent times, however, a new type known as jungle yellow fever has been found to exist. This type differs in many respects from that originally described and Dr. Soper, the Rockefeller Foundation authority on yellow fever, considers it to be the older and more permanent form of the disease.

"Urban and rural *aegypti*-transmitted yellow fever is generally acquired indoors, tends to affect non-immunes of all ages, spreads along the lines of human travel, and is easily controlled by reduction of the density of the vector. Jungle yellow fever, on the other hand, is acquired in or near the forest during working hours by those whose occupation takes them to the woods and does not affect other members of the household. The infection of man is apparently accidental occurring in the course of some cycle of infection of which man is not an essential part. Recently forest mosquitoes (*A. Leucocelaenus*, *Haemogogus capricorni* and species of *sabathines*) have been captured naturally infected and furthermore there is some evidence that certain monkeys commonly become infected; but it is difficult to fit all the observed facts into a simple mosquito-monkey-mosquito cycle of which man's infection is but an accidental offshoot."

Whereas, therefore, yellow fever was previously considered to be confined to coastal regions, it is now known to be widespread through vast inland areas of the South American continent and at the moment the problem of its eradication seems outside the bounds of practicability.

It had also been long believed that the endemic yellow fever areas in Africa were relatively restricted. Surveys made by using the mouse protection test have revealed, however, that the disease must have prevailed over much wider tracts of that continent and, in fact, the boundaries of the 'silent' areas are gradually being extended more and more eastwards as further surveys are carried out. It may well be that these areas are 'silent' only because of the lack of facilities for medical aid and for carrying out the necessary laboratory and animal tests.

i From the point of view of India and the Far East, the African endemic and 'silent' areas must be looked upon with equal suspicion and the Government

of India have continued to insist that the same preventive measures must be applied in respect of persons coming to India from both.

For the last two to three years, the Egyptian Quarantine Board has carried out all necessary measures, including disinsectisation of aircraft, for the prevention of spread of yellow fever to the north and east. By arrangement with the Government of India, the Board has also agreed to issue certificates of disinsectisation to all aircraft, coming from infected or suspected yellow fever areas, which are proceeding to India. In addition, the Director of the Board sends a telegraphic warning to the Airport Health Officer, Karachi, in respect of any passenger proceeding to India by air within nine days of his having left an infected or suspected yellow fever area.

The main British Empire air route in Africa runs from Alexandria to Cape Town and, in 1937, a West African line between Lagos and Khartoum was opened. With the opening of this branch air route, which crosses through a well known endemic area, it was obvious that the danger to India was enhanced unless stringent precautions were taken at Khartoum which has now become the key position for sanitary control of north-bound air traffic. The Sudanese authorities are very much alive to the necessity for taking all possible precautions against a yellow fever invasion and the measures taken in the Sudan provide a valuable barrier to the extension of infection to other countries including Egypt, Iraq and India. The *Aedes aegypti* has never been found in Khartoum and every possible step is taken to prevent its introduction there, while an intensive anti-*aedes* campaign is being carried out in every large centre in the Sudan. The Sudan Government has also made arrangements with the West African Governments under which no air passenger is permitted to leave those countries for Khartoum and Egypt unless he has resided in a yellow fever-free area for at least six days immediately prior to embarkation and passengers must be in possession of certificates to this effect signed by the Airport Health Officer of the port of embarkation. On arrival at Khartoum, each passenger must produce this certificate, otherwise he is detained under surveillance for six days. After the passengers disembark and before the removal of baggage, mails or passengers' effects, every compartment of the machine is thoroughly fumigated. In addition, if the Airport Health Officer at Cairo finds that a passenger is on his way to India, he is not allowed to proceed unless he is in possession of the necessary certificate.

Whilst it may be taken that suitable preventive measures are in force against the danger of the spread of yellow fever to India, it must, however, be remembered that no insurmountable defensive barrier has been built up. The change from land planes to sea planes has rendered control of aerodromes much more difficult. It will be obvious that a land aerodrome can be kept free from *Aedes* much more easily than a marine airport. Moreover, private aeroplanes will without doubt become an increasingly important factor, as these machines have frequently no definite route and may cross and re-cross infected areas without the cognisance of any health authority. Private aeroplanes may also intentionally or unintentionally enter India through airports other than Karachi, the authorised port of entry, and land in a place which is not equipped to take the necessary precautionary measures. Finally, although as far as is at present known, the most easterly infected region in Africa is Malakal in the Anglo-Egyptian Sudan, any spread of infection to the ports on the east coast of Africa would be attended with very serious consequences.

As regards this country, considerable progress has been made in the measures designed to prevent the introduction of yellow fever. In 1936, the Government of India issued regulations which prohibit entry to any person

who has started from an infected area within the previous nine days, unless he has been protected by satisfactory inoculation or by a previous attack of the disease. The Aerial Navigation Sanitary Convention lays down six days as the period of prohibition of entry and considerable criticism has been made of India's insistence on nine days, but there are good reasons for that extended period, for this country cannot afford to take any risks because of three factors, (1) the presence of large numbers of *stegomyia* mosquitoes, (2) the presence of a non-immune human population, and (3) the existence of a large reservoir of monkeys now known to be capable of carrying the disease.

Karachi is the airport of entry to India for all air traffic coming from the West. The aerodrome there may now be classed as "anti-amaryl" according to the Convention, as suitable steps have been taken to provide the airport with a health staff and to keep the *Aedes* index at a minimum. Adequate provision has also been made for the segregation of suspected or infected persons arriving by air, a 12-bedded mosquito-proofed isolation hospital having been built on the outskirts of the aerodrome. A mosquito-proofed ambulance is also available for the transfer to this hospital of suspected persons arriving at the marine airport.

In regard to protection by inoculation with the yellow fever vaccine, arrangements have been made with the Wellcome Research Laboratory in London to give training in the method of inoculation to Public Health and Medical Research Department officers who may be on leave in England. An emergency supply of the vaccine is also being kept at the Haffkine Institute in Bombay, whilst arrangements are being made under which supplies are earmarked in London for immediate despatch to India should an emergency arise. It would be of advantage to India in general and to the medical profession in particular if medical officers proceeding to England would use the opportunities afforded to learn the method of inoculation and to have themselves immunised. If yellow fever should break out, there will be an immediate demand for a large medical and preventive staff and it would be to their own advantage to be immune to the disease.

Considerable experience has now been gained in the use of the yellow fever vaccine. In a recent address to the Royal Society of Tropical Medicine and Hygiene in London, Dr. Soper reported, in connection with the preventive campaign against jungle yellow fever, that as individual immunisation of the exposed population alone offered any reasonable hope of prevention, "during the first nine months of 1938 more than 800,000 persons have been vaccinated with entirely satisfactory results and without serious complications of any kind." No evidence of increase in virulence of the attenuated virus now used for inoculation has been noted. "Studies in the laboratory demonstrate that anti-bodies appear in the blood after the 7th and before the 21st day and persist for at least one year. Results of post-vaccination protection tests indicate that approximately 95 per cent of those vaccinated under field conditions acquire immunity."* Dr. G. M. Findlay, of the Wellcome Research Laboratory, who has considerable experience of yellow fever virus work, does not consider that there is any risk of inoculated persons infecting *stegomyia* mosquitoes and of their giving rise to an epidemic of the disease. The

*"Yellow fever vaccination with cultured virus (17D) without immune serum" by H. H. Smith, H. A. Penna and A. Paolielli, *The American Journal of Tropical Medicine*, Vol. 18, No. 5, Sept. 1938.

new vaccine constitutes therefore an important weapon in the campaign of prevention.

Finally, the question of preventing the spread of the disease by the carriage of infected mosquitoes in aircraft is of the utmost importance. Disinsectisation of all aircraft coming from suspected or infected areas has been in general practice for the last two-three years. Various fumigants containing a pyrethrum base have been used by different authorities. Every compartment of the aircraft is freely sprayed with the fumigant before any unloading of baggage, mails, etc. is allowed, so that any mosquitoes present may be destroyed. Because of possible danger from fire following the use of a fluid diluted with kerosene oil, investigations have been made in respect of fumigants prepared with a watery base. With this new type of fumigant, it is proposed to carry out disinsectisation in the air immediately the aeroplane takes off and this method has the obvious advantage that mosquitoes which have gained an entry just prior to departure from an infected or suspected area will be destroyed before they have the opportunity of biting passengers or crew. The use of a thoroughly efficient disinfectant is a matter of great importance to India and no fumigant is accepted as such until it has been submitted to rigorous tests by the Malaria Institute of India.

The Government of India are acutely alive to the danger of the introduction of yellow fever into this country and, in the light of existing knowledge, every possible step is being taken to ensure that such a catastrophe may be avoided.

FORTY YEARS PROGRESS IN PUBLIC HEALTH.

Introduction.

118. These annual reports on the public health of India are rightly kept strictly impersonal in nature, but, in the last pages of the last annual report to which the writer's name will be attached, it seems opportune,—and it may be of some value,—to review the main developments which have taken place in public health in this country since the opening of the present century. Progress in public health is always slow and it is impossible to obtain any true perspective by comparing one year with the previous one or even one quinquennium with its predecessor. To obtain a balanced picture, it is necessary to take the long view and those experienced observers who are able to look back over the past thirty to forty years can note with satisfaction that great advances have gradually but steadily been made during that period. Not only so, but the *tempo* of development has markedly increased in many different directions during the past 10-15 years and there seems every hope that,—provided nothing untoward interferes,—the pace will quicken still further. The outstanding feature of those years, without any doubt, is the increasing interest of Governments and of the educated public in the great problems associated with the ill-health, pain and suffering affecting such large numbers of the people of this country. With deeper realisation of the importance of these problems, there has also begun to arise a new determination to combat those evils by organised effort, and this national awakening to realities is one of the most hopeful developments any public health officer could desire to witness. In spite of grave deficiencies still apparent in different directions, the public health movement in India has now gained a considerable momentum and may be expected to effect in increasing measure its true purpose, that of improving the physical well-being of the people of India and of enlarging their capacity for enjoyment of life.

Public Health Organisations.

119. Although the necessity for permanent health organisations at headquarters and for health staffs in both rural and urban areas had been recognised by the Government of India as early as the sixties of last century, for many years little or no sustained effort was made to provide these staffs. Even as late as 1919, when the Government of India Act of that year transferred the subjects of medicine and public health to elected Ministers, very few permanent health officers were to be found except in the large cities. A small number of pioneers in the public health field led a somewhat peripatetic existence in some of the larger towns; having no security of tenure, when they dared to produce honest reports condemning insanitary conditions, vested interests were powerful enough to have their services dispensed with. As for the rural areas, it was only seldom suggested that the villager, equally with the townsman, required sanitary guidance and supervision and the proposal that the appointment of district health officers was an essential first step towards improvement of rural health conditions would have been laughed to scorn. Whatever may be the opinion as to the handicaps at first experienced by provincial ministers, the transfer of public health to their hands marked the beginning of the effort to appoint to every municipality a qualified medical officer of health and to provide at least a skeleton public health staff in rural areas. During the last 20 years, considerable progress has been made and some provinces now have a complete district health staff comprising health officers, sanitary inspectors, vaccinators, etc. in each district, whilst in the more advanced areas the ideal of having a trained health officer in every municipality has almost been attained. Other provinces have not yet been able to go so far, but the desire for advance is to be found everywhere and it may be anticipated with some confidence that urban and rural health staffs will gradually be provided all over the country. It is now generally recognised that without a trained full-time staff, no organised health work is likely to be of much avail and the whole question of rural reconstruction, which is now receiving so much more attention, is so dependent for its success on improvement of the health of the rural populations, that progress in the future is likely to be even more rapid than it has been in the past two decades. Information relating to the existing public health staffs for rural and urban areas is given in Table B of Appendix IV of this report. The maternity services available in the different provinces are summarised in Table B of Appendix III.

The Central Advisory Board of Health.

120. A new organisation, whose object is the greater and more uniform advance of public health in India, has been constituted within the last two years. In June 1937, H. E. the Viceroy addressed the inaugural meeting of the Central Advisory Board of Health, whose members comprise representatives of the Central Government, the Health Ministers of provincial Governments, representatives of a number of States and members of the Central Legislatures. The idea of a Central Board of Health is no new one and its inauguration has marked a long-desired step forward in public health administration in this country. Experience had shown the necessity for providing machinery for discussion of mutual public health problems and for the formulation of a wider public health policy. Whilst no statutory powers or functions have been assigned to the Board, the discussions which have taken place at its two meetings have shown that its proceedings command a wide interest and the request has already been made that the Board should meet more frequently and that

a wider range of subjects should be included in its agenda. One important part of the Board's work is carried out by means of *ad hoc* expert committees appointed to report on special subjects. At the last meeting, a comprehensive report on "Maternity and Child Welfare Work in India" was presented and the subjects of "leprosy control" and "food adulteration" have now been referred to other special committees. These special reports, it is believed, will be of the greatest value to all public health organisations in India, prepared as they are by experts with wide experience of Indian conditions. In addition, the central organisation of the Board has been charged with the duty of developing a Central Information Bureau which will in time be a centre to which all interested may turn for information on public health subjects. The Bureau will also, it is hoped, be in a position to make available the substance at least of the "evergrowing mass of technical literature in many languages upon public health questions." The Central Advisory Board of Health has made a successful debut and there seems every hope that it will play an increasingly influential part in the future development of public health in every part of the country.

The All-India Institute of Hygiene and Public Health.

121. Another great advance in India has been made during the last five years through the beneficent generosity of the Rockefeller Foundation. The All-India Institute of Hygiene and Public Health, which stands in close proximity to the School of Tropical Medicine in Calcutta, was built and equipped with funds provided by that internationally minded body, whose purpose was to provide "some institution of an all-India character which would not only train graduates for the University diploma in public health but would provide those already engaged in public health work with facilities for training and for independent higher research, take up investigation of Indian health problems and questions and help to co-ordinate public health work all over India." The Institute which was opened in 1933 provides instruction for students preparing for diplomas in public health and in maternity and child welfare and for the Doctorate of Science of Public Health of the Calcutta University, whilst it also offers facilities for special courses in biochemistry and nutrition, malariology, epidemiology, vital statistics and maternity and child welfare. The Institute has six sections with a professor and assistant professor in each and works in close co-ordination, as regards instructional courses, with the School of Tropical Medicine. In addition to the ordinary and special courses mentioned above, the staff is also engaged in a number of research enquiries, which are financed by grants from the Indian Research Fund Association. An Institute of this nature, in the view of those best qualified to judge, should eventually have a profound effect on the development of public health activities in India and be of lasting benefit to her people, providing as it does up-to-date instruction to medical graduates desirous of taking up a public health career.

Rural Health.

122. In order to promote rural development, the Government of India allotted within recent years two grants of Rs. 92.5 lakhs and 103 lakhs to the provinces. The first grant was distributed in full and allotments from the second were to be made when the previous grant was exhausted and to the extent money was actually required. Public health measures, such as rural water supplies, rural sanitation and anti-malarial operations, were given a large share of all provincial allotments, but schemes for medical relief, agricultural and animal husbandry development, cottage industries, village communications,

rural broadcasting, etc. were also assisted. One of the provincial reports mentions that "a perusal of the inspection notes indicates that striking improvements are noticeable in many aspects of village life in the several selected villages, the enthusiasm of the villagers being aroused to a high pitch." At the same time, the warning may be given that permanent results are not likely to be obtained unless the villagers have been brought to take a genuine and abiding interest in respect of the improved conditions which have resulted. Experience of social reform work all over the world emphasises the importance of its continuation for at least a generation so that the youth of the community may grow up in an atmosphere of new ideas and new habits of life. The necessity for following up the work that has now been initiated is, therefore, paramount and it is to be hoped that the results obtained have successfully demonstrated what is possible by wise expenditure and that provincial Governments will be able to sustain these efforts intended to provide better living conditions to the people for whose welfare they are responsible.

It must be remembered that, in the field of rural hygiene, the application in this country of costly sanitary methods is outside the bounds of practical politics because of the immensity of the population and areas to be covered. Nearly 90 per cent. of the inhabitants of India live in rural villages, numbering several hundreds of thousands, and the scattered nature of the village communities, the general poverty and the very low standard of sanitation all make it difficult to achieve any very rapid advance. Realisation of this fact has made evident the supreme necessity for intensive study of the rural health problems in different parts of India before suitable lines can be laid down for sanitary development. With this end in view, organisations known as "Health Units" have been established in four or five different provinces, with financial assistance from the Rockefeller Foundation, and in this field of rural hygiene considerable progress has already been achieved. These health units cover only restricted areas and restricted populations, but the principles adopted, it may be emphasised, can easily be applied later on to larger rural populations and it is very much hoped that this recent activity will be the precursor of more widespread health work in different parts of the country. No very expensive equipment is required, but the work must be under the supervision of well qualified and trained personnel. One of the secondary objects of these health unit schemes is to provide demonstration areas for the practical training of fresh personnel to be employed later in similar work in other rural areas. The success which has already been attained by the health units at work in Madras, U. P. and in Delhi Province gives promise that by such methods, the gospel of health will gradually be spread to much larger numbers than in the past. These rural health campaigns depend largely for their success on the energy, enthusiasm and tact of the health officers and their staffs, because improvement of health depends as much on the mode of life of the individual as on the provision of sanitary amenities. The intimate relationships which the health staffs can establish with the people in the limited areas covered by the schemes provide an important element towards success.

Health Improvements in Delhi and New Delhi.

123. Since Delhi Province was formed in the early years of the present century the Public Health Commissioners with the Government of India have been its *ex-officio* Directors of Public Health. In that capacity, these officers have had the responsibility of advising the Central Government on health matters connected with old Delhi and with the new Imperial capital both during and after its construction.

In addition to the formation of an Improvement Trust for Delhi, three important public health improvements have been carried out during the past seven years and these have been of the greatest benefit to the health of the people living in Delhi and New Delhi. The first of these schemes was concerned with the prevention of malaria. Malarial conditions in and around the two cities were the subject of investigation and report in 1912 and again in 1926-27 but, apart from small-scale measures, the recommendations made in these earlier reports were not implemented. The high incidence of malaria became a cause of increasing anxiety and in 1934 a further expert investigation was made which showed that whilst temporary control over the breeding of malaria carrying mosquitoes was feasible, considerable expenditure was necessary if permanent improvement was to be attained. The Malaria Survey of India prepared a list of large and small works which were considered essential. The programme was examined by a special expert committee and, its recommendations having been accepted by the Government of India, the necessary funds were sanctioned by the Central Government. Since 1936, active steps have been taken both in respect of temporary anti-malaria measures and of major engineering works and most of these last have now been completed. It is satisfactory to be able to add that a large reduction in the incidence of malaria has already been recorded and, provided the whole programme is carried through and the necessary supervision is maintained, there seems every hope that this disease will to a great extent be eradicated from the two cities.

The second improvement which has been effected concerns the collection and disposal of house and street refuse. For many years past, this obnoxious material was deposited in close proximity to the boundaries of old and New Delhi and the two dumps have not only been a serious nuisance but must have had a most deleterious effect on the health of the people living in their vicinity. The new scheme now in force includes two railway sidings at which refuse carts are emptied directly into special railway wagons and the removal of the refuse by train to vacant waste land about 8-10 miles outside the city. This scheme cost almost Rs. 13 lakhs but the money has been well spent.

Finally, the rapid increase in population in Delhi and New Delhi during the last 10-20 years had rendered inadequate the system of sewage disposal at the Kilokri sewage farm, the land there being unable to deal with the large additional quantities of sewage. Investigation also showed that the sewers were in a bad state of repair and that the pumping machinery was unable to cope with the increased flow. In view of the further anticipated additions to the populations of both cities, a special committee was appointed in 1936 to report on the whole question. That committee accepted a proposal in respect of a bio-aeration purification system, previously made by the Public Health Commissioner and the Superintending Engineer, Health Services. The Government of India later sanctioned this scheme, in addition to the re-construction of main sewers and the provision of additional pumping plant. All these works were completed in October, 1938, and have given very satisfactory results. The cities of Delhi and New Delhi now possess an up-to-date sewage purification scheme which has been designed to meet additional demands arising from future increases of population and which should serve as a model to the rest of India for many years to come.

International Health Work and Port Health Administration.

124. In the international sphere, co-operation between the nations of the world for the prevention of the spread of infectious diseases has been a

remarkable feature of the present century. In this connection, it may be noted that under the Government of India Act of 1935, India's international obligations in respect of health matters constitute a statutory function of the Central Government.

The first step to establish co-ordinated international action in the public health field was taken in 1907 when, under an International Agreement signed at Rome by 12 countries, the Paris 'Office International d'Hygiene Publique' was founded.

The duties and functions of this new organisation are set out in Articles 4 and 5 of its Statutes of Constitution which run as follows :—

Article 4.—The principal object of the "Office" is to collect and bring to the knowledge of the participating States the facts and documents of a general character which relate to public health, and especially as regards infectious diseases, notably, cholera, plague and yellow fever, as well as the measures taken to combat these diseases.

Article 5.—The Governments shall inform the "Office" of the steps taken by them to insure the application of International Sanitary Conventions. The "Office" shall suggest the modifications which it might be advantageous to introduce into the provisions of these Conventions.

Although under these Articles the "Office" has been given a wide field, in practice it concerns itself mainly with the study of communicable diseases and of measures for their prevention and control, whilst most of the subjects included in the fields of social medicine and hygiene are dealt with by the Health Organisation of the League of Nations which works in close collaboration with the former body. Although the original Agreement was signed by only 12 countries, no less than 54 countries have now adhered to it and each of these countries is represented at the bi-annual meetings of the Permanent Committee by a senior medical officer of its official health service. At the meetings, a large number of communications and reports are dealt with on such subjects as the interpretation of Articles of the International Sanitary Convention or practices arising out of its application ; on administrative measures in respect of quarantine or other port health practices ; and on progress in the study of epidemic diseases. Much of the work of the Permanent Committee is carried out by means of Commissions, the members of which are specially qualified or particularly interested in the subject with which the Commission is concerned. Different Commissions deal with (1) Quarantine, (2) Yellow Fever, (3) Cholera, (4) The Brussels Agreement for the control of venereal disease among seamen, and (5) Aerial Navigation. The last named has in recent years been largely responsible for the new International Sanitary Convention of Aerial Navigation, 1933.

But the "Office" has other important activities. Under the International Sanitary Convention, signatory countries undertake to supply immediate information in respect of the outbreak or continued existence of the five Convention diseases, *viz.*, plague, cholera, smallpox, typhus and yellow fever and the 'Office' then distributes consolidated information to every signatory country. Serious outbreaks are notified by telegraph ; less urgent information is issued in a Weekly Bulletin.

In addition, the 'Office' publishes a monthly bulletin which comprises (a) the laws and regulations promulgated by different countries for the prevention and control of infectious diseases ; (b) information regarding the spread of

infectious diseases ; (c) information regarding measures taken to improve the health of different localities ; (d) public health statistics ; and (e) bibliographical notes.

India has always taken an active part in the deliberations of the ' Office '. Unfortunately, the Government of India have not yet found themselves in a position to ratify the International Sanitary Convention of 1926, but every effort has been and is being made to work up to the standards laid down in that Convention in regard to port health work and the control of international shipping and this country need not now fear comparison in these respects. The Public Health Commissioner with the Government of India is the permanent delegate from India to the Paris ' Office ', whilst he is also a member of the Health Committee of the League of Nations and of the Council of the Singapore Bureau of the League whose main function is to collate and disseminate epidemiological information from the countries and ports of the Far East.

Up till 1st April, 1938, the major ports of India were under the control of provincial Governments who acted in this matter as agents for the Central Government. On that date, the health administration of the seven major ports was assumed by the Government of India and active steps are being taken to place the health organisations in these ports on a more satisfactory basis. India is still regarded with suspicion as a reservoir of infection for such diseases as smallpox and cholera and it is of great importance to India's overseas trade that this suspicion should be dispelled as soon as possible. Considerable advance in port health organisation and in control of infectious disease has been made within the past few years, but the position will not be entirely satisfactory until the Government of India find it possible to announce their ratification of the two International Sanitary Conventions which have been framed for the health control of shipping and of air traffic.

Medical Research.

125. For many years past, the Government of India have maintained a number of medical research officers who were recruited to what was originally known as the Bacteriological Department, but is now called the Medical Research Department. Medical research in India was finally placed on a sound basis by the establishment in 1911 of the Indian Research Fund Association. The senior officers of the Medical Research Department have been regularly employed as Directors and Assistant Directors of the major laboratories in India and, in addition to these administrative duties, they have always engaged themselves in research work, the results of which have been of great value to the promotion of public health. The Indian Research Fund Association has throughout its existence depended for funds on grants from the Government of India and, except during the years of the Great War, its annual expenditure has varied between Rs. 7—12 lakhs. Although the Association has consistently taken a broad view of its responsibilities in encouragement of medical research, during recent years there has been a widening in the range of applications for grants and considerable sums are now sanctioned for approved research work carried out by the staffs of medical colleges, universities and private individual workers.

This is not the place to make any detailed survey of the researches carried out under the auspices of the Indian Research Fund Association. Such information may be obtained from the Indian Journal of Medical Research, the official publication of the Association, and from the summaries given in the Public Health Commissioner's annual reports. It may be said, however, that,

in the main, the work done under the auspices of the Association has been closely connected with India's most important diseases, and notable achievements have been recorded in respect of plague, cholera, malaria, kala-azar and other diseases. Although much has been done, many public health problems still await solution and it is to be hoped that medical research will continue to receive generous support not only from the Central and Provincial Governments, but also from those who are in a position to endow medical research and so to promote the welfare of their fellow countrymen. Medical research undoubtedly forms the basis for all sound preventive work, witness the methods of successful prevention in respect of plague which are founded on the results of the patient researches carried out by the Indian Plague Commission.

In respect of cholera, also, recent team work in India on the properties of pathogenic cholera vibrios has given an entirely new conception of the epidemiology of this disease, which unfortunately still claims so many victims every year in this country. At the request of the Cholera Commission of the 'Office International,' the cholera problem was attacked anew some four or five years ago and the results obtained have had warm appreciation from the Permanent Committee of the 'Office'. Further research, done in India in collaboration with workers in London, has resulted in the production of a new specific antigen for the diagnosis of true cases of cholera. The highly selective serum prepared from this antigen is not only essential in distinguishing the true cholera organism from others of similar morphology but it is hoped that it will eventually assist in throwing fresh light on the problem of the cholera carrier.

With regard to malaria, from the time of Ross the research work done in India has always been of a high standard. The discovery made by Ross may not have been followed, so speedily as was anticipated, by effective prevention of the disease, but only later was it realised that many other factors have to be taken into account in addition to the malaria parasites. New knowledge is constantly accruing in different directions and eventually the many difficult problems will no doubt be solved.

Not only have the researches carried out in India during the present century been of the greatest importance to the people generally, but that work has given India a high place in the estimation of those best qualified to judge and the names of many workers in India are well known to the whole scientific world. The members of the Paris 'Office' have also repeatedly expressed their deep appreciation of the research work done in this country. Apart from the large contributions to knowledge which have been made in different directions, it is also worth noting that the Indian Research Fund Association has provided the opportunity for the training in medical research of a large number of young Indian graduates and this body of skilled workers is bound to be of increasing value to India because the quest for new knowledge in the fight against disease goes on for all time, whilst, the greater the number equipped for such work, the more sure will become the foundations of public health work and the more scientific the practice of preventive medicine.

Nutrition.

126. Another direction in which marked progress has been made during recent years is in the field of nutrition. The Indian Research Fund Association had recognised the importance of sound nutrition of the people many years before the subject was taken up by the League of Nations and by the Governments co-operating with that international body, and the contributions made by Sir Robert McCarrison to this science are now seen to be much more generally applicable than was originally

realised. In more recent years, the practical aspects of the nutrition problem have received greater attention and the results of early laboratory researches have now been confirmed by field studies. These have made it clear that an immense amount of malnutrition and malnutritional disease exists among large sections of the people of India, whilst an adequate nutritional state is also known to be one of man's strongest defences against disease. Studies of the common foodstuffs and of the actual diets consumed have been incorporated in a Health Bulletin issued by the Government of India. Further researches have also demonstrated the advantages to be had from additions of milk,—even skimmed milk,—to the ordinarily unsatisfactory diet of large numbers of the people, whilst the common deficiency of Vitamin A in the diet has been shown to be possible of correction by the use of red palm oil, an oil which can be produced in India. The importance of this work from the practical point of view, *viz.*, of improving the diet of the poorer classes cannot be over-estimated; betterment of the nutritional state of the people of India will only be achieved by methods which are cheap and within a cost which can be borne by the villager's income.

Nutritional researches must, however, always be related to human requirements and that means correlation of these researches with the activities of animal husbandry and agricultural departments in order that these departments may know in which directions they should encourage agricultural practice in the areas under their control and which crops and other articles of food are necessary for improvement of the nutritional state of the population. This link between human nutritional requirements and agricultural practice has been forged by the appointment of a liaison officer trained in human nutritional work, whose duty it is to keep in touch with all provincial agricultural and animal husbandry departments.

The task of making the people familiar with the facts of scientific discovery and of persuading them when necessary to change their dietary habits in the light of these facts is one of the most difficult ever attempted by public health workers. In order to meet to some extent the requirements in this direction, within the last 2-3 years, several courses of instruction have been given by the Director of Nutritional Research at Coonoor to groups of medical and public health officers from different provinces and States in India. It is very much to be hoped that, with their new knowledge of modern nutritional needs, these officers will be able to teach the people among whom they work the methods to be adopted for improvement of diet.

The whole problem of improved nutrition in India is not only one of complexity and magnitude but is vital to all effort directed to raise the general standard of living of the rural populations. It also involves such issues as capacity for work, income, increased production of essential foodstuffs, transport, marketing and last, but not least, education. It may be claimed that, during more recent years, much has already been done to stimulate public interest and that the steps so far taken have been along the correct lines of approach. Since 1936, human nutrition has been the subject of special study by an Advisory Nutrition Committee of the I. R. F. A., of which the Public Health Commissioner is Chairman, and the deliberations of that Committee have not only provided a suitable guide to future researches but have given public health departments and others interested a useful summary of progress and an indication of the lines on which practical results can best be achieved. The Nutrition Committee from its birth included representatives of the agricultural and animal husbandry departments of the Central Government and

recently its membership has been increased by the inclusion of expert educational and economic advisers. It has also been recently recognised by the Government of India as a National Nutrition Committee and, through different agencies, it keeps in close touch with the international expert nutrition committees organised by the Health Organisation of the League of Nations. There is no question that India is becoming more alive to the needs in this field of public health activity and the great hope is that coordinated effort will enable continuous progress to be made in reducing the degree of malnutrition which has for so long been such a severe handicap to economic advance in this country.

Malaria.

127. Another serious public health problem in India is that of malaria; indeed, there is good reason for considering this disease as being responsible for more ill-health and death than any other of the epidemic diseases of the country. Moreover its incidence is probably three times higher in the rural areas than in the towns, so that it forms a terrible handicap to improved health and a higher standard of living among the rural populations. The three main lines of attack may be classified as (1) anti-mosquito measures, (2) general quininisation and (3) improvement of the economic standard of the people. Anti-mosquito measures on a scale sufficient to influence the incidence of malaria are probably not within the bounds of practical politics, although considerable relief would probably be attained by reduction of what is known as man-made malaria. The problem of quinine was discussed at length in last year's report, in which it was shown that serious difficulties deter rapid advance to any scheme of adequate quininisation of the malaria-stricken populations. Whether cheaper quinine can be made available is a matter which demands further serious study. The question of improving the economic standard of the rural populations opens up a wide vista of socio-economic activity which cannot be adequately reviewed here, but it may be asserted without fear of contradiction that the prosperity of the Indian peasant is the very foundation of all national progress. Much has been said and written regarding such factors as relief of debt, consolidation of fragmented agricultural holdings, improved agricultural practices, the development of co-operative societies and better marketing facilities. All these constitute measures which may be expected to assist the villager to raise his standard of health and well-being. Suffice it to add that signs are not wanting of a gradual awakening to the urgency and importance of these questions in the general attack on India's rural economic problems. The Malaria Institute of India, which has for many years past been engaged in malaria researches, has made clear the directions in which practical anti-malaria works should be tackled. The time seems ripe for a wider use of the knowledge available, but it is much to be feared that financial stringency will continue to handicap progress.

Recognising the importance of the malaria problem, the Government of India some two to three years ago placed a special grant of ten lakhs of rupees at the disposal of the Governing Body of the Indian Research Fund Association for malaria research. On the advice of the Public Health Commissioner, the Governing Body decided that this grant should be devoted to intensive control schemes carried on for a period of years in restricted areas in order to demonstrate the practical methods required for reduction of the incidence of malaria. Following that decision, grants were made to four provincial Governments on the conditions that those Governments contributed amounts equal to the I. R. F. A. grants and that approved schemes should be placed in charge of experienced antimalarial officers. In addition, a grant was made

to Delhi Province for anti-malarial work in the Najafgarh Health Unit area and for additional schemes in the villages lying round the cities of Delhi and New Delhi.

In Madras, Bengal and the United Provinces, suitable areas were selected on the recommendation of officers of the Malaria Institute of India in consultation with the provincial Directors of Public Health. The grant to Assam provided additional funds to the Assam Medical Research Society which had been engaged for some years past in intensive anti-malarial work. It is believed that these five-year schemes will not only be of great benefit to the local populations concerned, but will form a valuable guide to all Governments and malarialogists in India in planning future anti-malaria work.

Maternity and child welfare work.

128. The history of the maternity and child welfare movement in India dates back to the second half of the nineteenth century but, in the beginning, attention was naturally directed to providing skilled attendance to women at childbirth. The urge for this work arose from the fact that the women doctors in mission and Dufferin Fund hospitals quickly realised the dangers arising from the conducting of maternity cases by untrained indigenous or hereditary *dais*. Various attempts were made in different parts of the country to train the *dai* in more modern methods, the most successful effort being made in the Amritsar *Dais* School of the Church of England Zenana Missionary Society in the eighties of last century. Little progress, however, was made until the beginning of the present century.

Following an appeal by Lady Curzon for funds to be devoted to the betterment of conditions of childbirth, the Victoria Memorial Scholarships Fund was established in 1903 "to train midwives in the female wards of hospitals and female training schools in such manner as will enable them to carry on their hereditary calling in harmony with the religious feeling of the people and gradually to improve their traditional methods in the lights of modern sanitation and medical knowledge". As women's hospitals were the only institutions which could provide the facilities for such training, its administration was entrusted to the Dufferin Fund Committee.

The early years of the present century also saw the commencement of infant and child welfare work by enthusiastic voluntary workers. The necessity for a special class of health worker was felt from the beginning, if educational work, instruction in mothercraft, home visiting and adequate supervision of midwives were to be properly organised. In the West, these objects had been attained through health visitors and, with the aid of a Government of India grant of Rs. 6,000, the first health school was opened in Delhi in 1918. In the following year, a public appeal for funds was launched and in 1920 the Lady Chelmsford All-India League for Maternity and Child Welfare was founded. The League not only gave grants-in-aid to welfare centres, but carried out an active propaganda campaign and was in a position to give technical advice to voluntary committees all over the country. In the same year, an All-India Maternity and Child Welfare Exhibition held at Delhi drew pointed attention to the many problems associated with this aspect of public health administration.

The stimulus for these movements came mainly from the office of the Dufferin Fund, which was also concerned with the administrative control of the Victoria Memorial Scholarships Fund, the Lady Chelmsford League and the Association for the Provision of Health Visitors and Maternity Supervisors.

In 1930, the Indian Red Cross Society, with funds remaining in their hands after the Great War, took over the activities of these three organisations and established a Maternity and Child Welfare Bureau which has since done much to direct the movement on proper lines, through the Society's provincial and district branches. The work of the Bureau is in charge of an expert medical adviser obtained from the Women's Medical Service.

Finally, with the opening of the All-India Institute of Hygiene and Public Health at Calcutta in 1933-34, a professor was appointed for the subject of maternity and child welfare and a nine months' course was provided for women medical graduates.

In the provinces, the development of the maternity and child welfare movement has varied both in respect of organisation and administrative control and as regards progress. In Assam, Bengal, United Provinces, Central Provinces, N. W. F. Province and in Sind, the work is in the hands of the Red Cross Society, assisted by provincial grants. In Madras and Punjab, organisation and control are in the hands of the official public health departments. Madras is the only province in which a trained women doctor, with the status of an Assistant Director of Public Health, has been placed in charge of this work.

The progress made in this branch of public health endeavour, the deficiencies that exist and suggestions for improvement are all embodied in Section III of this and previous reports. It may be mentioned, however, that a special committee of the Central Advisory Board of Health has recently prepared a report dealing with every aspect of the question. This report contains no less than 53 recommendations, which lay down the lines along which maternity and child welfare work should be developed in this country during the coming years.

The great handicap to progress at the moment is the difficulty of inducing educated women to take up health visitors' work. It is to be hoped that in the future larger numbers of India's young women will see their way to train for this profession, in which they will find abundant scope for their energies and abilities and in which their services are so urgently needed.

Anti-Tuberculosis Work.

129. About 23 years ago a special enquiry into the incidence of tuberculosis in India was carried out by Dr. Lancaster, who was deputed to carry out this investigation by the Indian Research Fund Association. After visiting all the provinces and most of the large cities, he formed the opinion that tuberculosis was on the increase in India and suggested the desirability of forming an All-India Anti-Tuberculosis Association and of establishing closer co-operation between governmental and voluntary agencies in organising a suitable campaign against this disease.

The opportunity for the formation of a central organisation came only when, in 1929, various schemes were considered for the utilisation of the King George V Thanksgiving Fund. It was decided that this fund should be devoted to a campaign against tuberculosis and the King George Thanksgiving Fund Anti-Tuberculosis Committee was constituted. With an annual income of only Rs. 53,000 the activities of the Committee were necessarily restricted to a considerable extent. The organisation consisted of a Central Committee at New Delhi and branch committees in the provinces and States. The Central Committee employed an organising secretary who toured throughout the country, organised provincial and district branches, addressed public

meetings and medical gatherings and 'prepared propaganda material. A few films with Urdu and Hindi captions were also prepared, whilst a motor lorry was fitted up with a portable cinema and various exhibits, with a view to carrying out propaganda in the villages.

In addition, the Fund has organised special training courses in tuberculosis for medical men at the All-India Institute of Hygiene and Public Health, Calcutta, and at a number of provincial centres. In 1934, an anti-tuberculosis conference was held and was attended by representatives from provincial and State Anti-tuberculosis Committees, by medical officers from sanatoria and hospitals and by representatives of the All-India Institute of Hygiene and Public Health and the Indian Research Fund Association.

The special appeal for funds for fighting tuberculosis in India, which was issued in the name of the King Emperor by Her Excellency the Marchioness of Linlithgow in December 1937 has met with an excellent response and has made it possible to organise the anti-tuberculosis campaign on an extended basis. The Tuberculosis Association of India was formed a few weeks ago, incorporating the King Emperor's Anti-Tuberculosis Fund and King George Thanksgiving Anti-Tuberculosis Fund. It is expected that a considerable number of Provincial and State Associations will be formed in the near future and that these will affiliate with the Central Association.

The Central, Provincial and State Associations are all independent bodies governed by constitutions of their own. The functions of the central organisation will be "to offer expert advice and to become a co-ordinating agency, e.g., in standardising methods, in promoting consultations or conferences, in training workers and in educating the public by different forms of propaganda. The promotion of research will be another important function, while its work will be assisted by the formation of an Information and Statistical Bureau and by the publication of an All-India Tuberculosis Journal. On the other hand, the establishment of hospitals or clinics and the carrying out of preventive measures are functions of the Provincial or State Associations, so that a demarcation has been made between the respective spheres of activity. The Central Association, by its constitution, has not been debarred from undertaking the responsibility of providing treatment centres and it may later be desirable for the Central Association "to organise and support model institutions in Delhi in connection with its educational and research responsibilities". The Central Association proposes to appoint a medical officer of wide experience and high standing as its technical adviser and his services will be available to all Provincial and State Associations.

From this brief description of the evolution of the campaign against tuberculosis in India, it is clear that the last ten years have recorded considerable progress in organised effort. The success of the recent appeal by Her Excellency the Marchioness of Linlithgow and the formation of the Central, Provincial and State Associations mark an important stage in the development of the campaign and it may be anticipated with some confidence that these bodies will do much to stimulate and supplement the activities of official medical and health departments in their anti-tuberculosis work.

Leprosy.

130. For many years, anti-leprosy work in India was mainly confined to the maintenance of a number of leper asylums, organised by missions and other

private bodies. These organisations received grants-in-aid from Government and, within the limits of their resources, did valuable work in alleviating human suffering.

The new light thrown upon the problem of leprosy by the demonstration that early cases of the disease were amenable to treatment, coupled with the more effective methods which research work had made available, brought about a great mobilisation of new effort. In 1924, the British Empire Leprosy Relief Association was founded and the Association at once decided to make its campaign empire-wide. As a result, the Indian Council of the Association was inaugurated in January, 1925.

According to census figures, which expert investigation has shown to be far short of actual numbers, there are more lepers in this country than in any other part of the British Empire. The disease was so widespread and the misery so well known that the appeal for funds which issued after the formation of the Indian Council evoked a generous response from both princes and people. A capital fund of Rs. 20·25 lakhs was created and the annual income from this fund, originally amounting to Rs. 1,22,000, was made available for furthering anti-leprosy work in all directions. Later on, a further generous donation of Rs. 3·13 lakhs was received from Their Majesties' Silver Jubilee Fund.

The Indian Council planned its programme of work so that the limited resources at its disposal were utilised to the best advantage. The first task was to stimulate interest in the prevention of the disease which is now known to be definitely within scientific control. To achieve this object, it was decided, on the one hand, that research work should be intensified, and, on the other, that information should be broadcast not only in respect of causation and prevention but as regards new methods of treatment.

The actual execution of this programme is apportioned between headquarters and the provincial and State branches of which 17 were founded by the end of 1938. Such items of the programme as research, propaganda and training of doctors, which benefit the country as a whole, are mainly the concern of headquarters, whilst the provincial branches are responsible for the provision of treatment and other matters of local importance. For the latter purposes about 50 per cent. of the entire income of the Association is made available to provincial and State branches and a sum of Rs. 7,93,000 has been so distributed during the last 13 years. In addition, the branches have received grants both from provincial Governments and local bodies.

Research work has been carried on at the School of Tropical Medicine, Calcutta, in co-operation with the authorities of the School and the Indian Research Fund Association. This work has been carried out at a cost of Rs. 3,37,000 up to the end of 1938, and the results obtained have been published in the annual reports of the Association as well as in scientific journals in India and abroad. Special experimental investigations in childhood leprosy and in rural and urban control of the disease are also being carried on under expert supervision in certain selected areas in Bengal and Madras.

Propaganda has been carried on by the publication of a variety of books, pamphlets, leaflets and posters and through films and slides. A quarterly journal "Leprosy in India" has been published to provide a medium for exchange of ideas and experiences of leprosy workers generally. The propaganda officer employed by the Association is continuously on tour in the provinces and

States. His duties include inspection of treatment centres, experimental surveys for estimation of the local incidence of leprosy and the giving of advice to local authorities on the development of their anti-leprosy campaigns.

Special courses of instruction in the diagnosis and treatment of leprosy have been held at Calcutta and other centres at which over 1,000 doctors have received instruction. These trained doctors have in turn given instruction to many others, and medical men with up-to-date knowledge of leprosy are not now difficult to find in any part of this country.

The provision of treatment is undertaken by the 17 Provincial and State Branches of the Association, all of which are doing good work within the limits of their financial resources. Large numbers of patients are now seeking treatment at the leprosy clinics which now number about 1,100 in all. Every Branch reports the beneficial results obtained after regular and sufficiently long courses of treatment and such remarks as patients discharged "cured", "non-infectious", "symptom free", "disease arrested", "apparently cured", etc., are now commonly found in the records. When it is remembered that thousands of lepers are receiving proper treatment and that every "cured" or "improved" case brings to the clinics many others who were previously without hope, it will be realised how valuable is the Association's work.

The new provincial governments have given public health a prominent place in their development programmes, with the result that in a number of provinces increased financial support for anti-leprosy activities has already been obtained whilst, in others, expansion of existing schemes are under consideration. The average medical practitioner is also taking a much greater interest in the disease than before and the Association receives increasing demands for special training in treatment and prevention. For all these wider activities, the Indian Council of the British Empire Leprosy Relief Association can take considerable credit.

Venereal Diseases.

131. Public interest in the prevention of venereal diseases was stimulated by the visit during 1927-28 of delegates from the British Social Hygiene Council in response to an invitation from the Governments of Bombay, Madras, Bengal and Burma. After discussions with the authorities of these four provinces, the delegates paid a visit to Delhi, where members of the legislature, officials of the Government of India and representatives of voluntary organisations interested in the subject had opportunities of meeting the delegates, of hearing their views and discussing the problem. In their report, the visitors made a series of important recommendations covering all the varied aspects of the venereal diseases problem and these have been of great advantage to different medical and health administrators.

In Madras Presidency, where a considerable degree of organised effort has since been made, an up-to-date venereal diseases department has been located in a new and well-equipped building in the Madras General Hospital and placed in charge of a trained medical officer. Between 1935 and 1937, twenty-eight medical men and women were trained there in modern methods of diagnosis and treatment; the medical under-graduates of the Madras Medical College also receive clinical instruction twice a week and graduates studying for a public health degree are given lectures dealing with the problem from the public health

point of view. It is reported that the attendances of patients numbered 56,203 in 1935, 66,985 in 1936 and 75,969 in 1937, whilst during the same three years a total of 34,699 injections of arsenic, 24,227 of bismuth and 39,298 other injections were given. In addition to this central institution, 32 clinics are reported to have been working for the past few years in different parts of the province. In other parts of the country, no general campaign against venereal diseases has so far been planned.

In all countries, ignorance has played a large part in the spread of venereal diseases, and control has been effected partly by means of educational propaganda and partly through the provision of adequate treatment facilities. Instruction should include information not only on the specific facts relating to the diseases but in the elements of biology. In India, the problem is complicated by the general illiteracy of the population and by the fact that, in rural areas particularly, medical aid is not easily available. Some comfort may, however, be obtained from the following words used by the President of the 1937 Imperial Social Hygiene Conference when he referred to this country :—

“ In India there has, I think, been a most gratifying desire to respond to any co-operative help or encouragement we can give from this side. But we have now got to look, under the conditions of self-government, to the public spirit and patriotism of the leaders of the Indian people themselves to grapple with the problem. I have every confidence and hope that we shall see as one of the most striking results of the extension of self-government in India a real concentration upon some of her grave social problems and, I think, also a greater boldness in handling them when they touch upon old traditions than is possible on the part of rulers from outside whose first duty is that of impartiality and of non-interference in matters which affect religion.”

No campaign against venereal diseases can be successful without action against such social evils as prostitution and traffic in women. In India, these questions are complicated by various social customs and religious practices, but those need not be a serious handicap once public opinion is roused to the necessity for tackling this problem which is not the least of the many in the public health field awaiting solution.

Publicity.]

132. The importance of education is being increasingly realised in every walk of life and, in the field of public health, the need for instruction is equally great. The elements of the principles of healthy living must, however, be taught in such a way that they will gradually become incorporated in the ordinary lives of the people. Health education may be classified into three types. The first includes organised instruction by the use of printed literature, lectures, films and broadcast talk. Health education in schools falls into this category. The second covers personal instruction by doctor, health visitor, midwife or other worker either in the home or in a health centre. Health education of this type is ordinarily fruitful of results because of the more responsive attitude of the persons to whom it is given. Lastly, there is the gradual educative effect on the people through public health administrative practice. When an individual is compelled to conform to certain health standards in his daily life, the discipline imposed is bound in the long run to have a salutary effect on his whole outlook. For example, the standards of cleanliness which municipal byelaws enforce on a butcher or barber in the practice of his trade undoubtedly in time influences his ideas in respect of the sanitary environment of his home.

Since the wider development of public health organisations in the provinces, considerable attention has been paid to health education in all three directions. Many provincial public health departments have organised at headquarters a propaganda section which is concerned in the preparation of different propaganda material and in the development of different propaganda methods suited to local requirements, whilst the local urban and rural health staffs regularly devote part of their time to the dissemination of health knowledge among the people. Health films have been produced in some provinces and in other areas motor vans have been fitted up with propaganda material and with portable cinema apparatus in order that the propaganda campaign may reach the rural villager more readily.

In addition, the Indian Red Cross Society has done a great deal to spread knowledge of health ; a summary of its work will be found in Section X (page 215) dealing with the health activities of voluntary organisations.

The Central Government's responsibilities are mainly concerned with India's international health obligations and with medical research under the Indian Research Fund Association and the Medical Research Department. Publicity in respect of these has been widely carried out. Information regarding vital statistics and the prevalence of epidemic diseases in India is issued to the press in a series of weekly and quarterly reports. Frequent communiqués to the Indian press based on research findings in India are issued from the office of the Public Health Commissioner. At the six-monthly meetings of the "Office International d'Hygiène Publique" in Paris and also at the Health Committee of the League of Nations, articles and papers dealing with public health and medical research in India are regularly presented and both these International bodies have repeatedly expressed their indebtedness to India for these contributions.

The annual reports of the Public Health Commissioner contain a large amount of useful material presented in a form suitable for the non-medical educated community. Subjects of general interest, such as housing, nutrition, the yellow fever menace to India, drug control and physical education, all find a place. At the time of the publication of these reports, a series of notes is issued to the press, and these have received wide notice all over India. It has been noted that, particularly within recent years, these press notes are utilised as the text for leaders and special articles on different health subjects and the newspaper discussions which follow the issue of the Public Health Commissioner's reviews all assist in the general health propaganda campaign.

The office of the Public Health Commissioner is also responsible for the publication of what are known as Health Bulletins, of which 26 have been issued. Some of these are of interest only to scientific workers ; others are of more general interest, such as those entitled "What malaria costs India" and "The nutritive value of Indian foods and the planning of satisfactory diets". The latter has made a particularly wide appeal, as is evidenced by the fact that nearly 25,000 copies have been sold. A new and revised edition of this bulletin is now in the press.

The value of broadcast talks in connection with health propaganda has not been ignored. During the last three years, a considerable number of talks on different aspects of public health has been given by officers connected with the Central Government's public health organisation.

Under the auspices of the Central Advisory Board of Health also, an organisation is being built up for the collection and dissemination of information relating to health matters. A considerable amount of material has already been collected from different provinces and States and is being examined with a view to its distribution. In connection with the last two meetings of the Central Advisory Board of Health, a series of memoranda on different health subjects was prepared and these and the special committee's report on maternity and child welfare, to which reference has already been made, have been widely distributed.

A considerable basis of truth lies in Mr. H. G. Well's criticism that "the world has moved from the horse cart and the wind mill to the aeroplane and dynamo but that education has made no equivalent advance". Instruction in the principles of health is as difficult to "get across" as any other type of education. Little success can be achieved in changing the habits of life of the people unless they are approached in a spirit of sympathetic understanding. Public health and medical departments are naturally responsible for a large part of health education activities, but private practitioners, school masters and the educated sections of the community must all contribute to the task of leading their less fortunate brethren into healthier methods of life.

Conclusion.

133. In these pages, some of the more important public health events of the past thirty to forty years have been described. Many other branches of public health activity might have been included, such as housing, sanitation, water supplies, drainage and sewage. In all these, and in one way or another, a certain amount of progress has been made but only a fraction of what is necessary before it is made possible to the people of India to enjoy a more healthy and hygienic life. The pages of these health reviews regularly unfold the tale of much preventable sickness and mortality. Malaria alone accounts for nearly one and a quarter million deaths annually, and heavy mortality also occurs from such diseases as enteric fever, tuberculosis and respiratory diseases. The disabilities of mothers and children constitute another problem of the first magnitude, ranking possibly next to that of malaria. Recorded vital statistics indicate, too, that Indian death rates at every age period are still much higher than those of countries which have highly developed health organisations. What is more, both rural and urban populations, particularly the former, still suffer severely from recurring outbreaks of epidemic diseases which as a cause of sickness and death have been largely suppressed in western countries. In India, preventive work has so far been very largely concerned only with the major epidemic diseases and, although within recent years considerable success has been achieved in this field, these epidemics still take far too heavy a toll of life to justify any slackening of effort. Finally, it must be recalled that over 90 per cent. of the whole population still lives in rural villages and it is perhaps not sufficiently realised that on the prosperity, well-being and working capacity of that large and vital section of the community chiefly depends the economic progress of this country as a whole.

That is the depressing side of the picture. On the other hand, the summary which has been given in these last pages will have shown that sound public health foundations have been laid capable of carrying the superstructure of modern hygienic practice. In addition, the greatly increased public interest evinced in health matters, the efforts, both official and voluntary, being made to

promote the health of the people, and the wide powers possessed by popularly elected governments,—some of which have already organised Health Ministries and are engaged in providing themselves with up-to-date public health legislation,—all warrant the belief that more rapid progress will be made in the future than in the past towards an improved standard of living and a higher level of health throughout the length and breadth of this great land.

A. J. H. RUSSELL, COLONEL, I.M.S.,

Public Health Commissioner with the Government of India.

NEW DELHI;

The 18th March, 1939.

APPENDICES.

TABLE.

PAGE.

APPENDIX I.—RELATING TO SECTION I ON THE STATE
OF PUBLIC HEALTH IN BRITISH INDIA.

A. Estimated population in rural and urban areas	252
B. Estimated population by age and sex	253
C. Births in rural and urban areas	254
D. Births by months	254
E. Deaths by months	255
F. Death rates <i>per mille</i> by months	256
G. Deaths by months in rural areas	256
H. Deaths by months in urban areas	257
I. Deaths according to age and sex	258
J. Death rates according to age and sex	259
K. Deaths according to age in rural areas	260
L. Deaths according to age in urban areas	261
M. Infantile mortality rate in towns having a population of 30,000 and over	262
N. Infantile mortality in rural and urban areas	264
O. List of diseases notifiable in certain towns, States and the different provinces of British India during the year 1937	265

APPENDIX II.—RELATING TO SECTION II ON CHIEF
DISEASES.

A. Deaths and rates <i>per mille</i> from chief groups of diseases	276
B. Deaths and rates <i>per mille</i> from chief group of diseases in rural and urban areas	277
C. Deaths from cholera for five-year periods from 1905-24 and for individual years from 1925-36 in British provinces and Indian States	278
D. Deaths from cholera in rural and urban areas	279
E. Deaths from cholera by months	279
F. Deaths from plague by months in— (i) British India	280
& (ii) Indian States	280
G. Deaths and rates <i>per mille</i> from smallpox in rural and urban areas	281
H. Deaths from smallpox by months	281
I. Deaths and rates <i>per mille</i> from fevers and malaria	282
J. Deaths from fevers by months	282
K. Deaths and rates <i>per mille</i> from dysentery and diarrhoea in rural and urban areas and by sex	283
L. Deaths from dysentery and diarrhoea by months	283
M. Deaths and rates <i>per mille</i> from respiratory diseases in rural and urban areas and by sex	284
N. Deaths from respiratory diseases by months	284
O. Quinine and cinchona febrifuge issued in various provinces	285

TABLE.

PAGE.

APPENDIX III.—RELATING TO SECTION III ON
MATERNITY AND CHILD WELFARE.

A. Maternal death rates per 1,000 births in certain towns	288
B. Maternity and child welfare centres in rural and urban areas . . .	290
C. Schedule for Type I Maternal mortality enquiry	291
D. Schedule for Types II and III Maternal mortality enquiries . . .	292
E. Schedule for provision of institutional midwifery	297
F. Schedule for staff available for domiciliary midwifery	298

APPENDIX IV.—RELATING TO SECTION IV ON
PUBLIC HEALTH ADMINISTRATION.

A. Expenditure on public health by the Government of India and Provincial Governments	300
B. Public health staffs in rural and urban areas	301

APPENDIX V.—RELATING TO SECTION VI ON
VACCINATION AGAINST SMALLPOX.

A. Vaccination operations performed in British India and in different provinces	304
--	-----

APPENDIX VI.—RELATING TO SECTION VII ON
PUBLIC HEALTH WORKS.

A. Number of towns having protected water supplies in different pro- vinces	306
--	-----

APPENDIX VII.—RELATING TO SECTION VIII ON
MEDICAL RESEARCH.

List of scientific papers by research workers under the Government of
India, the I. R. F. A. and provincial Governments during 1937—

A. (i) Papers published in the Indian Journal of Medical Research	308
(ii) Papers published in the Records of the Malaria Survey of India	313
B. Papers published in the Indian Medical Gazette	314
C. Papers published in other journals	318
D. List of anti-rabic treatment centres	320

APPENDIX VIII.—RELATING TO SECTION IX ON JAILS.

A. Sickness and mortality from principal diseases	340
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Appendix I

relating to

Section I.

Deaths in the rural areas of British India and the provinces are given in table G distributed according to months and in table K by age and sex. The total figure for British India does not, however, correspond in the two cases. This is because, for Madras Presidency, the figures shown in table G are for the area exclusive of municipalities alone, whilst those of table K relate to an area excluding municipalities and rural towns. For this reason the total figure in table G is greater than that of table K by 59,665.

Deaths in urban areas are given in tables H and L. For the above reason the total figure in table L is greater by 59,665 than that in table H.

The figures in tables G and H together equal those in K and L.

TABLE A.—ESTIMATED POPULATION ON 30TH JUNE, 1937, IN RURAL AND URBAN AREAS AND BY SEX.

	Rural.	Urban.	Total.	Male.	Female.	Area in square miles.	Density per square mile.
BRITISH INDIA.	246,524,425	25,882,011	272,406,436	140,319,500	132,086,936	740,863	358
N.-W. P.	2,134,954	338,835	2,523,589	1,365,898	1,157,691	13,308	190
Punjab	22,638,283	3,431,344	26,069,627	14,103,662	11,905,965	96,614	270
Delhi	214,266	484,891	699,157	402,934	296,223	578	1,210
U. P.	46,513,147	5,376,862	53,390,009	27,523,296	24,866,713	106,248	493
Bihar	33,283,433	1,397,459	34,685,892	17,374,167	17,321,725	69,343	500
Orissa	6,985,397	223,949	7,209,846	3,434,829	3,775,017	19,347	373
Pengal	48,661,507	3,534,298	52,195,805	27,127,149	25,068,656	72,514	720
O. P.	14,792,017	1,823,379	16,604,396	8,286,602	8,318,294	98,730	168
Romhary	15,681,303	3,702,453	19,383,756	10,040,288	9,343,468	76,389	254
Sind	3,491,970	745,584	4,237,554	2,378,243	1,859,311	46,663	91
Madras	43,281,856	3,919,309	47,201,665	23,374,864	23,826,801	125,438	376
Coorg	155,146	9,473	164,619	91,070	73,549	1,593	103
Assam	8,227,708	210,538	8,438,246	4,442,749	3,995,497	31,882	269
Ajmer-Merwara	407,938	183,837	591,775	313,899	277,936	2,711	218

TABLE C.—BIRTHS IN RURAL AND URBAN AREAS.

	Rate p. m.			
	Rural.	Urban.	Total.	Total.
BRITISH INDIA	8,483,765	904,692	9,388,457	34.4
N.-W. P.	62,283	10,244	72,527	28.5
Punjab	968,376	422,151	1,090,727	42.8
Delhi	10,442	20,701	31,143	42.7
U. P.	1,408,891	240,515	1,738,996	32.2
Bihar	1,072,847	27,810	1,100,657	32.2
Orissa	230,029	5,117	241,746	33.9
Bengal	1,025,199	91,851	1,107,050	33.4
C. P.	648,804	74,136	622,939	37.1
Bombay	601,723	127,753	729,476	38.4
Sind	50,426	20,003	70,429	14.4
Madras	1,548,053	152,679	1,701,662	35.8
Coorg	3,486	543	4,028	22.5
Assam	241,510	6,705	248,224	29.4
Almor-Merwara	14,457	7,520	21,963	31.8
				40.9

254

TABLE D.—TOTAL BIRTHS BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep ⁴ .	Oct.	Nov.	Dec.
BRITISH INDIA	776,858	707,075	780,583	719,949	685,780	654,433	746,553	807,631	853,223	902,234	891,353	883,095
N.-W. P.	6,865	5,428	6,009	5,603	5,030	5,450	6,096	5,639	5,700	6,228	6,364	6,777
Punjab	92,879	78,347	83,250	67,832	67,490	73,420	89,318	100,704	106,213	112,462	110,953	107,839
Delhi	2,435	2,094	2,008	1,844	1,846	2,029	2,665	3,012	3,434	3,833	3,420	3,084
U. P.	152,477	131,447	131,805	128,158	106,621	100,149	130,684	163,285	183,657	183,059	165,677	160,837
Bihar	76,965	86,271	95,600	92,661	78,304	75,042	83,246	95,778	107,721	105,269	101,270	102,491
Orissa	22,080	21,996	22,203	21,524	20,974	20,404	19,174	19,037	15,353	17,133	20,214	21,154
Bengal	154,257	151,338	178,131	142,560	118,298	103,222	107,729	107,800	126,753	156,758	180,775	179,439
C. P.	49,877	40,498	46,783	46,481	45,100	44,880	53,340	59,580	58,001	62,738	58,950	56,046
Bombay	56,467	49,986	59,000	56,981	57,457	58,178	64,530	67,934	65,474	67,369	62,355	63,029
Sind	7,674	6,097	5,797	6,180	5,346	5,106	6,113	6,749	6,971	8,400	7,377	6,480
Madras	120,547	109,295	120,083	130,062	140,141	148,702	164,529	158,086	151,851	152,884	140,668	146,759
Coorg	204	284	315	319	379	415	431	400	335	301	248	298
Assam	36,008	22,025	20,711	19,196	10,664	15,171	16,592	17,366	19,203	23,240	25,082	26,430
Almor-Merwara	2,013	1,459	1,517	1,569	1,440	1,806	1,956	2,272	2,948	2,084	1,967	1,862

TABLE E.—TOTAL DEATHS BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA	537,499	493,612	456,216	491,249	504,400	479,105	460,377	497,873	509,453	534,008	586,110	640,473	6,112,375	22.4
N.-W. P.	4,838	3,570	3,517	2,872	4,041	4,173	3,708	3,946	4,450	4,023	4,753	5,070	50,170	19.9
Punjab	47,788	42,519	40,455	38,063	52,089	54,070	44,074	45,504	44,900	44,083	40,981	53,342	556,268	21.3
Delhi	1,310	1,323	1,303	1,450	1,672	1,804	1,262	1,477	1,102	1,103	1,234	1,435	16,030	23.8
U. P.	84,519	71,915	74,200	90,564	94,500	90,500	83,446	81,002	86,326	88,776	86,084	100,171	1,035,003	19.8
Bihar	50,034	51,780	51,956	61,027	62,338	62,752	59,288	61,128	64,310	65,828	60,005	60,302	729,454	21.0
Orissa	23,580	17,220	18,110	16,946	14,823	12,405	12,701	15,653	14,484	15,013	16,678	21,487	199,165	27.6
Bengal	107,466	83,809	101,062	108,629	98,491	76,406	80,379	86,907	95,825	100,826	132,067	156,124	1,232,071	23.6
C. P.	44,042	32,215	30,571	37,590	40,587	41,202	31,046	38,567	47,451	52,061	49,519	48,646	500,030	30.1
Bombay	43,550	34,150	37,414	38,860	40,031	32,526	36,434	43,371	46,906	45,547	43,341	40,000	493,208	25.4
Sind	5,750	4,925	4,471	3,940	3,705	2,940	3,090	3,286	3,050	3,475	3,939	4,280	46,860	11.1
Madras	107,785	77,000	70,060	74,601	82,432	80,475	86,851	91,706	83,764	85,465	92,302	115,804	1,054,430	22.3
Coorg	298	292	313	352	379	497	501	461	373	374	278	372	4,485	27.2
Assam	14,488	11,473	10,736	13,811	15,480	17,161	15,864	15,121	14,088	15,206	15,582	16,385	170,054	20.9
Almor-Mervata	1,447	1,807	1,443	1,845	1,818	1,444	943	1,717	1,096	1,303	1,257	1,366	17,641	29.6

TABLE F.—DEATH RATES PER MILLE BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	23.7	19.1	30.2	21.6	32.2	21.1	20.3	21.9	22.4	23.5	24.9	26.2
N.-W. F. P.	23.0	17.0	16.7	13.7	19.2	19.8	17.6	18.8	21.2	22.0	22.6	27.0
Punjab	22.0	16.6	13.6	17.8	24.0	25.2	20.6	20.9	20.7	20.6	21.8	24.9
Delhi	22.5	22.9	22.4	24.9	28.7	32.5	21.7	25.4	19.9	18.9	21.9	24.9
U. P.	19.4	18.5	17.0	20.7	21.0	20.7	19.1	19.2	19.3	20.3	20.4	23.9
Bihar	17.5	17.9	18.0	21.1	21.6	21.7	20.5	21.1	22.2	22.8	23.9	24.0
Orissa	39.2	28.7	30.1	28.2	24.7	20.7	20.1	26.1	24.1	25.0	27.8	35.8
Bengal	24.7	19.3	23.4	25.0	21.5	17.6	18.5	20.0	22.0	25.2	30.4	35.9
C. P.	31.8	23.3	26.4	27.2	20.3	20.8	22.4	27.8	34.3	38.1	35.8	38.2
Bombay	27.0	21.1	23.2	24.1	24.8	20.1	22.6	29.9	29.1	28.2	26.8	28.5
Sind	16.3	13.9	12.7	11.2	10.5	8.3	8.8	9.3	8.6	9.8	11.2	13.1
Madras	27.4	19.6	19.3	19.0	21.0	20.5	22.1	23.8	21.8	21.7	23.5	23.4
Goorg.	21.4	21.3	22.8	25.7	27.6	36.2	36.5	33.6	27.2	27.3	20.3	27.1
Assam	20.6	16.3	15.3	19.6	22.0	24.4	22.5	21.5	20.9	21.7	22.2	23.3
Ajmer-Merwara	29.3	26.5	29.3	37.4	36.9	29.3	19.1	34.3	34.2	27.7	25.5	27.7

TABLE G.—DEATHS BY MONTHS IN RURAL AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m.
British India	433,390	389,934	411,203	438,498	447,268	424,127	410,287	441,167	455,643	481,049	511,479	579,764	5,473,316	23.2
N.-W. F. P.	4,209	3,181	3,139	2,366	3,439	3,507	3,125	3,487	3,968	4,154	4,207	4,998	43,770	20.0
Punjab	42,264	38,134	30,082	33,190	45,665	47,151	38,021	39,383	39,376	39,612	42,083	47,359	488,845	31.6
Delhi	419	351	351	422	560	617	425	451	350	365	419	586	5,306	24.8
U. P.	72,679	62,262	62,839	75,794	74,930	74,047	70,501	69,315	72,003	75,453	76,137	86,023	871,983	18.7
Bihar	49,345	50,717	50,623	59,427	60,767	60,992	57,662	59,397	62,736	64,021	67,359	67,626	710,677	21.3
Orissa	23,105	16,893	17,735	16,580	14,408	12,159	12,361	15,241	14,124	14,632	16,241	21,007	194,521	27.8
Bengal	100,333	78,513	96,850	102,819	87,566	71,432	75,244	80,663	89,527	103,023	121,569	147,904	1,157,443	23.8
C. P.	30,305	28,404	32,637	33,410	35,927	36,490	27,206	33,332	42,291	47,303	44,405	45,615	444,825	30.1
Bombay	34,571	26,997	29,335	30,189	31,284	25,410	28,278	38,528	38,194	37,039	34,803	36,564	391,183	24.9
Sind	4,235	3,703	3,269	2,781	2,498	1,944	7,997	2,056	1,981	2,379	2,764	2,883	32,430	9.3
Madras	97,005	68,428	67,758	66,596	73,713	72,282	79,322	82,420	76,259	76,356	82,368	104,099	945,310	31.8
Coorg.	239	201	260	306	347	450	438	388	327	321	234	317	3,887	35.1
Assam	14,204	11,259	10,494	13,497	15,202	10,300	15,495	14,773	14,337	14,925	15,192	16,078	172,256	20.9
Ajmer-Merwara	977	896	935	1,120	942	846	688	1,133	1,170	876	703	795	10,581	20.9

TABLE H.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA	54,609	43,678	47,014	52,753	57,132	54,978	50,110	56,706	53,810	52,959	54,631	60,679	639,059	24.7
N.-W. P. . .	929	389	388	506	602	606	588	459	491	400	516	672	6,490	18.9
Punjab . . .	5,524	4,385	4,373	5,473	6,504	7,519	6,043	6,121	6,524	5,071	4,308	5,083	67,423	19.6
Delhi . . .	391	972	957	1,028	1,112	1,277	887	1,026	812	748	815	840	11,324	23.4
U. P. . .	11,840	9,653	11,301	14,770	16,570	16,453	12,945	14,987	14,323	13,323	12,647	14,148	163,029	27.7
Bihar . . .	1,289	1,072	1,328	1,000	1,571	1,700	1,026	1,720	1,583	1,807	1,646	1,700	18,777	13.4
Orissa . . .	475	392	375	366	320	306	340	412	300	381	437	480	4,644	20.7
Bengal . . .	7,133	6,330	5,812	5,810	5,925	4,974	5,355	6,384	6,298	6,663	7,198	8,220	75,538	21.4
C. P. . .	4,737	3,811	4,034	4,180	4,660	4,712	3,840	4,575	5,100	5,358	5,114	55,030	55,211	30.3
Bombay . . .	8,970	7,132	8,079	8,680	8,747	7,116	8,156	9,843	8,772	8,508	8,538	9,446	102,026	27.6
Gand . . .	1,524	1,222	1,262	1,159	1,207	990	1,093	1,250	1,099	1,000	1,185	1,447	14,430	19.4
Madras . . .	10,780	8,578	8,302	8,005	8,719	8,193	8,525	9,385	8,505	8,609	10,024	11,705	109,220	27.9
Coorg . . .	54	31	53	47	32	47	63	73	46	53	44	55	598	63.1
Assam . . .	234	214	242	314	287	361	350	348	351	341	390	307	3,798	18.0
Ajmer-Merwara . . .	470	411	568	725	876	698	355	584	516	402	554	571	6,690	38.2

TABLE I.—DEATHS ACCORDING TO AGE.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	827,357	681,212	584,763	553,453	170,991	156,040	96,885	85,346	93,213	114,956
N.-W. F. P.	6,063	4,715	5,590	5,019	1,029	1,435	974	856	1,003	929
Punjab	97,543	80,292	56,192	50,424	15,486	13,835	11,036	10,260	9,978	9,952
Delhi	2,788	2,400	1,920	1,799	376	308	164	240	231	336
U. P.	137,081	110,422	112,898	97,756	22,453	19,453	15,951	14,403	14,530	14,746
Bihar	70,204	57,324	78,844	72,555	25,330	21,400	14,306	10,741	13,501	12,098
Orissa	27,655	24,238	13,725	14,028	4,564	4,151	2,411	2,178	2,923	3,850
Bengal, C. P.	162,340	188,430	96,843	101,654	44,571	41,974	22,817	18,063	21,426	33,335
Bombay	63,248	54,010	57,519	50,760	13,262	11,555	6,713	5,968	7,003	8,924
Sind	5,024	4,110	3,677	3,310	1,414	1,252	908	752	787	774
Madras*	157,087	131,833	86,137	80,650	24,284	23,900	12,354	12,876	12,008	18,107
Coorg	468	425	252	269	90	100	91	67	115	114
Assam	21,350	18,377	13,768	13,123	6,693	5,857	3,674	3,294	3,794	4,979
Ajmer-Merwara	2,622	2,343	2,463	2,252	312	280	191	183	150	262
	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	215,619	277,389	231,017	318,943	243,476	178,955	249,072	197,640	476,586	450,063
N.-W. F. P.	2,133	2,114	2,101	2,054	2,124	1,556	2,006	1,478	3,710	2,582
Punjab	15,447	16,929	14,966	14,705	16,709	13,249	18,414	14,640	42,905	34,236
Delhi	574	798	458	569	547	403	436	331	1,103	843
U. P.	38,398	40,240	38,659	36,245	44,546	32,027	49,544	30,592	86,857	74,112
Bihar	37,165	33,615	34,423	29,241	32,716	24,743	33,323	29,620	49,883	52,053
Orissa	7,504	11,204	8,484	8,547	8,496	6,961	9,746	9,949	13,200	15,416
Bengal, C. P.	51,357	75,953	54,288	49,239	52,780	36,727	47,925	36,788	77,130	67,341
Bombay	14,724	18,052	15,897	14,462	17,491	12,913	17,860	15,121	36,377	38,377
Sind	13,700	20,141	16,146	15,817	18,956	13,044	20,267	14,582	36,095	46,127
Madras*	2,298	2,561	2,752	2,977	2,794	1,453	2,384	1,106	4,304	2,728
Coorg	28,073	43,243	33,621	36,532	36,677	29,604	36,789	31,447	102,000	105,837
Assam	292	311	380	246	319	161	238	157	218	103
Ajmer-Merwara	7,923	11,563	8,128	8,113	7,776	5,749	7,365	5,631	11,004	8,494
	468	665	454	435	565	400	755	504	1,178	1,133

* Madras includes 504 deaths amongst Euro peans and Anglo-Indians.

M.—Males.

F.—Females.

TABLE J.—DEATH RATES ACCORDING TO AGE.

	Under 1 year.*		1-5 years.		5-10 years.		10-15 years.		15-20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . . .	169.5	153.3	36.6	34.0	9.3	9.4	5.7	5.8	7.3	9.1
N.-W. F. P. . . .	148.1	149.3	33.5	31.1	8.4	9.1	5.6	6.6	8.3	9.1
Punjab	169.0	155.4	32.4	29.4	8.3	8.6	6.4	7.2	7.3	8.1
Delhi	170.3	162.4	51.3	48.7	8.8	8.4	3.8	7.1	5.3	10.4
U. P.	148.6	135.2	35.9	30.8	6.4	6.4	4.9	5.5	5.8	6.8
Bihar	124.4	106.9	36.0	32.0	10.2	9.2	6.7	5.7	9.6	8.3
Orissa	222.8	206.1	36.7	35.2	10.8	10.1	6.3	5.7	8.7	10.8
Benual	183.1	168.7	31.5	31.5	12.0	12.7	7.0	6.2	9.0	12.6
C. P.	230.7	205.8	58.6	49.1	12.4	11.2	7.0	6.5	10.4	11.6
Bombay	168.0	153.0	46.9	46.5	8.1	9.0	4.3	5.1	5.2	7.5
Sind	116.6	119.9	13.6	12.8	4.5	5.2	3.4	4.0	3.8	4.8
Madras	180.5	158.6	31.8	31.0	7.9	8.0	4.5	4.8	6.2	8.3
Coorg	226.3	216.8	33.2	34.7	10.3	10.0	9.1	7.4	12.5	15.0
Assam	166.5	153.2	60.1	77.9	15.9	19.7	5.5	6.5	4.8	6.5
Ajmer-Merwara . . .	210.2	234.3	70.4	64.1	8.1	8.3	5.2	6.0	4.8	10.2

* Ratios have been worked out per 1,000 of live births.

	20-30 years.		30-40 years.		40-50 years.		50-60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . . .	8.9	11.4	11.5	12.3	17.6	14.8	30.2	25.9	86.4	81.4
N.-W. F. P.	9.1	9.6	11.7	13.0	17.9	16.3	28.1	27.0	64.8	66.9
Punjab	6.3	8.2	8.1	10.2	12.3	13.1	22.0	22.9	57.7	61.5
Delhi	6.5	13.2	7.0	14.6	14.2	17.5	22.5	25.4	87.4	92.9
U. P.	7.4	8.0	9.7	10.2	16.0	13.3	31.0	25.2	83.8	70.6
Bihar	11.2	10.8	13.7	11.8	19.2	15.2	34.4	30.2	78.4	67.4
Orissa	12.9	15.5	16.9	14.8	23.4	17.0	43.8	37.4	100.6	93.0
Bengal	10.3	15.3	13.5	15.3	20.8	18.6	35.4	31.8	85.3	81.4
C. P.	10.0	12.0	13.8	12.3	21.2	16.6	37.4	31.8	110.6	98.3
Bombay	8.1	11.6	10.4	12.3	19.2	15.3	30.3	28.2	128.6	125.3
Sind	5.1	6.8	7.3	8.5	12.2	9.1	21.0	14.0	58.3	44.4
Madras	7.3	9.6	10.1	11.2	16.6	13.5	27.4	22.5	93.8	94.2
Coorg	14.8	20.2	21.3	23.6	33.8	26.9	53.6	45.1	86.6	79.0
Assam	20.0	23.4	15.9	17.8	12.0	10.5	12.8	9.5	78.5	60.0
Ajmer-Merwara . . .	8.0	13.2	10.7	11.8	10.9	13.6	40.3	32.0	123.6	107.0

M.—Males.

F.—Females.

TABLE I.—DEATHS ACCORDING TO AGE IN URBAN AREAS.

	Under one year.		1-5 years.		5-10 years.		10-15 years.		15-20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . . .	103,443	87,390	63,741	62,337	14,028	13,753	8,735	9,780	9,919	15,079
N.-W. F. P. . . .	758	631	769	692	153	144	95	114	141	139
Punjab	11,185	9,686	6,237	5,906	1,909	1,953	1,371	1,533	1,295	1,601
Delhi	1,806	1,671	1,206	1,262	232	203	94	177	148	207
U. P.	26,733	22,494	17,907	17,729	2,654	2,342	1,724	2,406	1,824	3,625
Bihar	2,136	1,699	1,645	1,389	547	486	433	342	429	437
Orissa	465	401	207	189	72	70	50	56	80	94
Bengal	8,888	7,272	4,317	4,115	1,931	1,740	1,285	1,072	1,571	1,964
C. P.	8,982	7,251	5,443	5,142	1,043	950	604	660	852	1,442
Bombay	14,780	12,969	9,954	10,171	1,079	1,700	878	1,006	1,070	1,850
Sind	2,316	1,952	1,161	1,135	280	240	155	174	210	304
Nadras*	24,280	19,877	13,307	13,262	3,299	3,196	1,808	1,972	2,145	3,357
Coorg	16	16	9	18	12	14	11	7	21	15
Assam	427	384	236	230	103	111	58	65	89	110
Ajmer-Merwara . . .	1,202	1,097	844	836	94	86	70	77	45	154
20-30 years.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . . .	27,098	35,547	25,626	23,602	26,773	17,782	26,853	17,793	56,406	53,538
N.-W. F. P. . . .	316	260	243	213	259	137	295	138	519	385
Punjab	1,940	2,424	1,787	1,801	1,603	1,639	2,283	1,804	4,097	3,730
Delhi	416	611	312	375	356	251	276	165	742	543
U. P.	4,434	8,051	4,279	4,918	4,709	3,506	5,335	3,455	12,801	11,440
Bihar	964	961	1,025	705	877	500	754	539	1,479	1,380
Orissa	203	276	206	198	303	154	311	194	447	521
Bengal	6,246	5,803	4,426	3,277	3,781	2,624	3,678	2,505	5,284	4,779
C. P.	1,700	2,664	1,621	1,921	1,862	1,352	1,897	1,332	4,295	4,411
Bombay	3,809	5,263	3,949	3,479	4,276	2,405	4,157	2,406	8,262	7,964
Sind	699	724	673	472	719	325	664	286	1,128	878
Nadras*	5,893	8,100	6,908	6,269	7,132	4,755	6,744	4,697	10,106	10,917
Coorg	85	88	117	20	78	16	36	13	21	21
Assam	246	245	235	120	249	103	212	105	280	184
Ajmer-Merwara . . .	143	312	144	136	179	115	218	124	408	381
50 years & over.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . . .	56,406	53,538	26,853	17,793	26,773	17,782	26,853	17,793	56,406	53,538
N.-W. F. P. . . .	519	385	295	137	259	137	295	138	519	385
Punjab	4,097	3,730	2,283	1,804	1,603	1,639	2,283	1,804	4,097	3,730
Delhi	742	543	356	251	356	251	276	165	742	543
U. P.	12,801	11,440	5,335	3,455	4,709	3,506	5,335	3,455	12,801	11,440
Bihar	1,479	1,380	877	500	877	500	754	539	1,479	1,380
Orissa	447	521	311	194	303	154	311	194	447	521
Bengal	5,284	4,779	3,678	2,505	3,781	2,624	3,678	2,505	5,284	4,779
C. P.	4,295	4,411	1,862	1,352	1,862	1,352	1,897	1,332	4,295	4,411
Bombay	8,262	7,964	4,157	2,406	4,276	2,405	4,157	2,406	8,262	7,964
Sind	1,128	878	664	286	719	325	664	286	1,128	878
Nadras*	10,106	10,917	6,744	4,697	7,132	4,755	6,744	4,697	10,106	10,917
Coorg	21	21	36	13	78	16	36	13	21	21
Assam	280	184	249	103	249	103	212	105	280	184
Ajmer-Merwara . . .	408	381	179	115	179	115	218	124	408	381

* The figures include 504 deaths amongst Europeans and Anglo-Indians.
 M.—Males. F.—Females.

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS.

Towns.	Rate p. m. live- births.	Towns.	Rate p. m. live- births.
<i>N.-W. F. Province.</i>		<i>Bengal Presidency—contd.</i>	
Peshawar	181.0	Titagarh	199.1
Dera Ismail Khan	96.4	Naihati	112.1
<i>Delhi.</i>		Bhatpara	203.7
Delhi City	9.2	Calcutta	252.7
New Delhi	3.6	Sirajganj	220.7
<i>United Provinces.</i>		Dacca	193.9
Dehra Dun	242.4	Narayanganj	242.9
Saharanpur	286.9	Mymensingh	142.9
Hariwar Union	283.5	Barisal	162.5
Muzaffarnagar	174.5	Chittagong	207.2
Meerut	161.5	<i>Central Provinces.</i>	
Khurja	221.6	Nagpur	234.6
Aligarh	182.2	Jubbulpore	235.8
Hathras	266.4	Saugor	268.5
Muttra	228.4	Khandwa	244.0
Agra	196.9	Burhanpur	214.6
Bareilly	149.4	Raipur	227.4
Budaun	221.3	Bilaspur	209.0
Moradabad	156.9	Amraoti	170.6
Amroha	199.2	Akola	211.3
Sambhal	176.7	<i>Bombay Presidency.</i>	
Shahjahanpur	191.3	Bombay	246.3
Pilibhit	216.8	Jalgaon	143.4
Farrukhabad-cum-Fatehgarh	253.2	Dhulia	135.8
Etawah	283.4	Surat	272.1
Cawnpore	339.5	Broach	155.5
Allahabad	225.8	Nadiad	306.5
Jhansi	322.2	Godhra	222.2
Benares	265.2	Ahmedabad	280.2
Mirzapur-Bindhachal	245.8	Ahmednagar	161.4
Jaunpur	197.0	Poona	344.4
Gorakhpur	201.0	Nasik	256.1
Lucknow	223.5	Malegaon	174.2
Fyzabad-Ajodhya	174.1	Bandra	141.5
Bahraich	167.1	Kurla	219.3
<i>Bengal Presidency.</i>		Belgaum	198.8
Asansol	116.5	Gadag-Bettigeri	164.2
Bankura	212.7	Bijapur	135.9
Hooghly-Chinsura	120.2	Sholapur	198.4
Serampur	120.0	<i>Sind.</i>	
Howrah	265.0	Karachi	142.2
South Suburban	201.2	Hyderabad	205.1
Baranagar	219.9	Sukkur	111.8
		Shikarpur	209.0

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGE TOWNS—*contd.*

Towns.	Rate p. m. live- births.	Towns.	Rate p. m. live- births.
<i>Madras Presidency.</i>		<i>Madras Presidency—contd.</i>	
Bellary	196·1	Tellicherry	99·3
Adoni	119·8	Nellore	246·4
Conjeevaram	157·1	Vellore	157·3
Saidapet	175·6	Virudhunagar	220·6
Coimbatore	169·0	Srivilliputtur	129·3
Erode	147·9	Salem	163·1
Cocanada	277·0	Cuddalore	156·2
Rajahmundry	272·0	Tanjore	168·4
Guntur	189·7	Kumbakonam	167·8
Tenali	152·2	Nogapatam	148·8
Bezwada	261·0	Mayavaram	137·7
Masulipatam	256·3	Tuticorin	203·9
Madras	223·8	Tinnevely	204·0
Madura	201·7	Palamcottah	135·0
Diadigul	145·8	Trichinopoly	170·4
Calicut	117·5	Vizagapatam	237·6
Palghat	161·5	Vizianagram	208·2
Cannanore	124·2		

TABLE N.—INFANTILE MORTALITY IN RURAL AND URBAN AREAS.

	Rural.		Urban.	
	Deaths.	Rate p. m. live-births.	Deaths.	Rate p. m. live-births.
British India	1,327,736	156·5	190,833	210·9
N.-W. F. P.	9,389	150·7	1,389	135·6
Punjab	156,964	162·7	20,871	170·9
Delhi	1,622	155·3	3,566	172·3
U. P.	198,276	132·3	49,227	204·7
Bihar	123,693	115·3	3,835	137·9
Orissa	51,027	215·6	866	169·2
Bengal	285,110	175·4	15,680	191·3
C. P.	120,059	218·8	16,113	217·3
Bombay	89,519	148·8	27,739	217·1
Sind	4,866	96·5	4,268	158·3
Madras	244,763	158·0	44,157	289·2
Coorg	861	247·0	32	59·0
Assam	38,916	161·1	811	121·0
Ajmer-Merwara	2,671	184·8	2,299	305·5

TABLE C.—LIST OF DISEASES NOTIFIABLE IN CERTAIN TOWNS, STATES AND THE DIFFERENT PROVINCES OF BRITISH INDIA DURING THE YEAR 1937.

A.—BRITISH INDIA.

Provinces.	Diseases notifiable.	Remarks.
N.-W. F. P.	Cholera. Plague. Smallpox. Typhus fever. Relapsing fever. Cerebrospinal fever. Anthrax.	
Punjab	Cholera. Smallpox. Plague. Measles. Chickenpox. Diphtheria. Tuberculosis (includes Tubercle of the lungs). Scarlet fever. Typhus fever. Enteric fever. Erysipelas. Relapsing fever. Influenza. Puerperal fever. Cerebrospinal fever. Dysentery. Leprosy. Mumps. Whooping cough. Sprue.	
Delhi Province	Cholera Plague. Measles. Smallpox. Chickenpox. Diphtheria. Tuberculosis. Scarlet fever. Typhus fever. Enteric fever. Influenza & Pneumonia. Cerebrospinal fever. Erysipelas.	Notifiable in the Municipalities of Delhi city, New Delhi and Notified areas of the Fort and Civil Lines.
United Provinces	Cholera. Plague. Smallpox. Diphtheria. Measles. Scarlet fever. Pulmonary tuberculosis. Enteric fever.* Cerebrospinal fever.*	Declared notifiable by Government under section 279 of the Municipalities Act for all municipal towns of these provinces.
Bihar	Cholera. Smallpox. Plague.	

* Notifiable only by medical practitioners.

Provinces.	Diseases notifiable.	Remarks.
Orissa*	Cholera	} Notifiable in the Municipalities of North Orissa under the B. & O. Municipal Act.
	Smallpox.	
	Plague	
	Tuberculosis	
	Acute Influenza	} Municipalities of South Orissa under the Madras District Municipalities Act with the previous approval of the Collector of the District concerned.
	Pneumonia.	
	Anthrax	
	Chickenpox	
	Cholera	
	Diphtheria.	
	Enteric fever	
	Glanders.	
	Leprosy	
	Plague	
	Smallpox	
	Tuberculosis.	
	Typhoid fever	
	Influenza	
	Relapsing fever	
	Rabies	
Bengal*	Cholera.	
	Plague.	
	Smallpox.	
	Cerebrospinal meningitis.	
	Diphtheria.	
	Anthrax.	
	Chickenpox.	
	Dysentery (both bacillary and amoebic.)	
	Enteric group of fevers.	
	Leprosy.	
	Measles.	
	Relapsing fever.	
	Tuberculosis (all-forms).	
	Typhus fever.	
	Whooping cough.	
	Epidemic dropsy.	
Central Provinces	Plague.	
	Cholera.	
	Smallpox.	
	Influenza.	
	Relapsing fever.	
	Acute Poliomyelitis.	
	Anthrax.	
	Epidemic pneumonia.	
	Encephalitis Lethargica.	
	Diphtheria.	
	Measles.	
	Scarlet fever.	
	Typhus.	
	Typhoid.	
	Mumps.	
	Dysentery.	
	Whooping cough.	
	Tuberculosis of lungs.	
	Chickenpox.	
	Puerperal fever.	
	Cerebrospinal meningitis.	
	Leprosy.	

*Notification of infectious and contagious diseases is not compulsory in the rural areas of this province.

Provinces.	Diseases notifiable.	Remarks.
Bombay Presidency	Plague Cholera Smallpox Enteric fever Scarlet fever Yellow fever Diphtheria Typhus Relapsing fever Puerperal fever Tuberculosis Leprosy Influenzal pneumonia Cerebrospinal fever	Notifiable in Bombay and Ahmedabad cities.
	Plague Cholera Smallpox Cerebrospinal fever Enteric fever Influenza	In other urban areas.
Sind (Excluding Karachi city).	Cholera. Smallpox. Plague. Influenza. Cerebrospinal fever.	
Madras Presidency	Acute influenzal pneumonia. Anthrax. Chickenpox. Cholera. Diphtheria. Enteric fever. Glanders. Leprosy. Plague. Smallpox. Tuberculosis. Relapsing fever. Typhoid fever Influenza Rabies	In Muffassal Municipalities only.
Coorg	Cholera. Plague. Smallpox.	
Assam	Cholera Smallpox Plague Influenza Cholera Plague Smallpox Kala-Azar Tuberculosis Typhoid Diphtheria	In rural areas. In all municipalities. In Shillong Municipality only.
Ajmer-Merwara	Plague. Cholera. Typhus. Relapsing fever. Cerebrospinal fever. Influenza. Enteric group. Smallpox.	

Towns.	Diseases notifiable.	Remarks.
B.—Towns.		
Lahore town	Plague. Cholera. Smallpox. Measles. Chickenpox. Diphtheria. Tuberculosis (includes tubercle of lungs). Scarlet fever. Typhus fever. Enteric fever. Erysipelas. Relapsing fever. Influenza. Puerperal fever. Cerebrospinal meningitis. Dysentery. Leprosy. Mumps. Whooping cough. Sprue.	
Delhi City	Cholera. Plague. Measles. Smallpox. Chickenpox. Diphtheria. Tuberculosis. Scarlet fever. Typhus fever. Enteric fever. Influenzal pneumonia. Cerebrospinal fever. Erysipelas.	
Lucknow City	Cholera. Plague. Smallpox. Diphtheria. Measles. Scarlet fever. Pulmonary tuberculosis. Enteric fever. Cerebrospinal meningitis.	} Notifiable by medical practi- } tioners only.
Patna town	Cholera. Smallpox. Plague.	
Calcutta City	Cholera. Plague. Smallpox. Cerebrospinal meningitis. Diphtheria. Enteric fever. Leprosy.	

Town.	Diseases notifiable.	Remarks.
B.—Towns—contd.		
Nagpur City	Plague. Cholera. Smallpox. Influenza. Relapsing fever. Acute Poliomyelitis. Anthrax. Epidemic pneumonia. Encephalitis Lethargica. Diphtheria. Measles. Scarlet fever. Typhus. Typhoid. Mumps. Dysentery. Whooping cough. Tuberculosis of lungs. Chickenpox. Puerperal fever. Cerebrospinal meningitis.	
Bombay City	Plague. Cholera. Smallpox. Enteric fever. Scarlet fever. Yellow fever. Diphtheria. Typhus. Relapsing fever. Puerperal fever. Tuberculosis. Leprosy. Influenzal pneumonia. Cerebrospinal fever.	
Karachi City	Cholera. Plague. Smallpox. Cerebrospinal fever. Enteric fever. Influenzal pneumonia. Diphtheria. Leprosy. Tuberculosis. Yellow fever.	
Madras Town	Cholera. Plague. Smallpox. Pulmonary tuberculosis. Diphtheria. Enteric fever. Measles. Chickenpox. Rabies. Anthrax. Leprosy.	

Indian States.	Diseases notifiable.	Remarks.
C.—INDIAN STATES.		
Central India Agency	Plague. Cholera. Typhus. Relapsing fever. Cerebrospinal fever. Influenza. Enteric group. Smallpox.	
Hyderabad State	There is no Epidemic Diseases Act in the Hyderabad State but the usual custom has been to declare plague, cholera, smallpox, cerebrospinal fever, diphtheria and epidemic influenza as infectious diseases. An Epidemic Diseases Act has already been carefully prepared and submitted by the Public Health Department for sanction of H. E. E. the Nizam's Government. This when sanctioned will make plague, cholera, smallpox, relapsing fever, diphtheria, c. s. fever, typhus, epidemic influenza and pneumonia compulsorily notifiable in this State.	
Baroda State	Plague. Cholera. Smallpox. Influenza. Tuberculosis Typhoid Meningitis	In Baroda City only.
Mysore State (Madras).	Cholera Smallpox Plague Tuberculosis Rabies Typhoid Para-typhoid	
		Throughout the Mysore State both in rural and urban areas.
		In the Sanitary Board Area, Kolar Gold Field only.
Cochin State (Madras)	Anthrax. Chickenpox. Cholera. Diphtheria. Enteric fever. Glanders. Leprosy. Plague. Smallpox. Tuberculosis. Typhoid fever.	
Travancore State (Madras).	Cholera. Smallpox. Plague. Typhoid. (From the middle of August 1937).	
Pudukottai State (Madras).	Nil.	
Jawhar State	Cholera. Plague. Smallpox. Influenza.	

Indian States.	Diseases notifiable.	Remarks.
C.—INDIAN STATES—contd.		
Cooch Behar State (Bengal).	Cholera. Smallpox. Plague.	
Jammu and Kashmir States.	Cholera. Plague. Typhus fever. Smallpox. Diphtheria. Measles. Tuberculosis. Cerebrospinal meningitis.	
Rajputana States	Plague. Cholera. Typhus. Relapsing fever. Cerebrospinal fever. Influenza. Enteric group. Smallpox.	
<i>Punjab States.</i>		
Patiala State	Cholera. Plague. Smallpox. Tuberculosis. Cerebrospinal fever. Typhoid fever.	
Nabha State	Cholera. Plague. Smallpox.	
Kapurthala, Dujana & Nalagarh States.	Cholera. Plague. Smallpox. Measles. Chickenpox. Diphtheria. Tuberculosis (includes tubercle of lungs). Typhus fever. Enteric fever. Erysipelas. Influenza. Cerebrospinal meningitis. Mumps. Whooping cough. Sprue. Scarlet fever. Relapsing fever. Puerperal fever. Leprosy.	
Bhawalpure State	Cholera. Plague. Smallpox. Chickenpox. Tuberculosis. Enteric Fever. Whooping Cough. Measles. Typhus fever.	
Jind, Sirmoor and Chamba States.	Cholera. Plague. Smallpox.	

Indian States.	Diseases-notifiable.	Remarks.
C.—INDIAN STATES— <i>contd.</i>		
<i>Punjab States—contd.</i>		
Faridkot State . . .	Cholera. Plague. Smallpox. Diphtheria. Tuberculosis. Cerebrospinal meningitis. Leprosy. Measles.	
Malerkotla State . . .	Cholera. Plague. Measles. Chickenpox. Tuberculosis (includes tubercle of lungs). Erysipelas. Enteric fever. Influenza. Puerperal fever. Cerebrospinal fever. Dysentery. Mumps. Whooping cough. Smallpox.	
Kalsia State . . .	Cholera. Plague. Smallpox. Leprosy. Tuberculosis. Relapsing fever. Measles. Chickenpox. Diphtheria. Scarlet fever. Erysipelas. Influenza. Mumps. Whooping cough. Cerebrospinal meningitis.	
Pataudi State. . .	Cholera. Plague.	
Bilaspur State . . .	Cholera. Plague. Smallpox. Measles. Chickenpox. Diphtheria. Enteric fever. Influenza. Cerebrospinal fever. Whooping cough. Mumps. Relapsing fever. Leprosy. Puerperal fever.	
Mandi State . . .	Cholera. Smallpox. Plague. Diphtheria. Typhus. C. S. Fever. Leprosy. Tuberculosis (including tubercle of lungs).	

Indian States.	Diseases notifiable.	Remarks.
<i>C.—INDIAN STATES—contd.</i>		
<i>Kolhapur and Deccan States.</i>	Cholera. Dysentery and diarrhoea. Typhoid fever. Influenza. Cerebrospinal fever. Malaria. Plague. Rabies. Measles. Smallpox. Diphtheria. Whooping cough. Tetanus. Tuberculosis, Phthisis. Leprosy. Syphilis. Septic abortion. Septicæmic puerpera. Gonorrhoea. Mumps. Enteric fever. Erysipelas. Chickenpox.	
<i>Phaltan and Ramdrug States.</i>	Cholera. Smallpox. Plague. Tuberculosis.	
<i>Aundh and Kurundwad (Junior) States.</i>	Cholera. Dysentery and diarrhoea. Typhoid fever. Influenza. C. S. fever. Malaria. Plague. Rabies. Measles. Smallpox. Diphtheria. Whooping cough.	
<i>Miraj (Senior)</i>	<i>Nil.</i>	
<i>Janjira State</i>	Cholera. Dysentery. Diarrhoea. Typhoid fever. Influenza. Malaria. Measles. Smallpox. Whooping cough.	
<i>Sawantwadi State</i>	There is no Act in force in the Sawantwadi State making parti- cular diseases notifiable.	
<i>Akalkot State</i>	Cholera. Smallpox. Plague. Influenza.	

Indian States.	Diseases notifiable.	Remarks.
~~C. INDIAN STATES—contd.~~		
<i>U. P. States.</i>		
Tehri Garhwal State .	Cholera. Plague. Smallpox. Cerebrospinal fever. Diphtheria.	
Benares States .	Cholera. Smallpox. Measles. Plague.	
Rampur State .	Cholera. Smallpox. Plague. Cerebrospinal fever. Measles.	

Appendix II
relating to
Section II- Chief diseases.

TABLE A.—DEATHS AND RATES P. M. FROM CHIEF GROUP OF DISEASES.

Province.	Cholera.			Small-pox.			Plague.			Fevers.			Dysentery and Diarrhoea.			Respiratory Diseases.			Other causes.			Total.	
																						Deaths.	Rate p. m.
	Deaths.	Rate p. m.		Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.		Deaths.	Rate p. m.		Deaths.	Rate p. m.		Deaths.	Rate p. m.			
BRITISH INDIA .	99,054	0.4	54,810	0.2	28,169	0.1	3,569,590	13.1	267,479	1.0	487,319	1.8	1,605,954	5.9	6,112,375	22.4							
N.-W. F. P. .	24	0.001	973	0.4	...	...	39,979	15.8	468	0.2	3,005	1.2	5,721	2.3	50,170	19.9							
Punjab .	105	0.004	3,991	0.2	4	0.0	376,803	14.5	10,470	0.4	58,957	2.3	105,988	4.1	556,268	21.3							
Delhi .	...	...	643	1.0	...	...	9,279	13.3	512	0.7	3,679	5.3	2,517	3.6	16,630	23.8							
U. P. .	6,341	0.1	3,200	0.06	24,036	0.5	792,203	15.1	17,126	0.3	44,628	0.9	147,409	2.3	1,035,003	19.8							
Bihar .	13,949	0.4	7,485	0.2	1,470	0.04	584,873	16.9	4,006	0.1	3,306	0.1	114,365	3.3	729,454	21.0							
Orissa .	5,076	0.7	2,209	0.3	...	...	105,931	14.7	17,194	2.4	4,885	0.7	63,810	8.9	499,165	27.6							
Bengal .	32,710	0.6	27,944	0.5	...	...	775,586	14.9	58,800	1.1	96,986	1.9	242,945	4.7	1,232,971	23.6							
C. P. .	1,107	0.07	460	0.03	1,002	0.06	232,359	17.0	33,761	2.0	45,518	2.7	135,829	8.2	500,036	30.1							
Bombay .	10,902	0.6	1,810	0.09	506	0.03	164,130	8.5	28,094	1.4	111,487	5.8	176,189	9.1	493,208	25.4							
Sind .	2	0.0	798	0.2	16	0.004	27,410	6.5	1,177	0.3	9,098	2.1	8,359	2.0	46,860	11.1							
Madras .	23,307	0.5	2,446	0.05	1,127	0.02	286,094	6.1	84,276	1.8	95,906	2.0	560,674	11.9	1,054,430	22.3							
Coorg .	1	0.0	9	0.05	8	0.05	3,471	21.1	143	0.9	223	1.4	630	3.8	4,485	27.2							
Assam .	5,440	0.6	2,187	0.3	...	...	109,376	13.0	12,832	1.6	6,702	0.8	39,468	4.7	176,054	20.9							
Ajmer-Merwara	...	...	505	1.0	...	...	11,437	19.3	570	1.0	2,930	5.0	2,100	3.5	17,641	29.8							

TABLE B.—DEATHS AND RATES P.M. FROM CHIEF GROUP OF DISEASES IN RURAL AND URBAN AREAS.

Province.	Cholera.				Smallpox.				Plague.				Fevers.				Dysentery and Diarrhoea.				Respiratory diseases.				
	Rural.		Urban.		Rural.		Urban.		Rural.		Urban.		Rural.		Urban.		Rural.		Urban.		Rural.		Urban.		
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	
BRITISH INDIA	91,721	0.4	7,333	0.3	48,812	0.2	5,998	0.2	25,876	0.1	2,293	0.1	3,375	206	13.7	194,384	7.5	210,607	0.9	56,872	2.2	332,430	1.3	154,889	6.0
N.-W. F. P.	24	0.01	...	...	656	0.3	317	0.9	...	...	...	...	37,132	17.0	2,847	8.4	266	0.1	202	0.6	1,589	0.7	1,466	4.3	
Punjab	49	0.002	56	0.01	3,342	0.2	649	0.2	1	0.0	3	0.0	347,414	15.4	29,389	8.6	6,584	0.3	3,886	1.1	43,067	1.9	15,290	4.5	
Delhi	...	...	...	...	9	0.04	634	1.3	...	...	...	...	3,730	17.4	5,549	11.4	30	0.1	482	1.0	1,162	5.4	2,517	5.2	
U. P.	5,313	0.1	1,028	0.2	2,416	0.05	784	0.1	22,155	0.5	1,881	0.3	732,013	15.7	60,250	10.3	4,722	0.1	12,404	2.1	7,521	0.2	87,107	6.3	
Bihar	13,521	0.1	428	0.3	7,071	0.2	414	0.3	1,410	0.04	60	0.04	575,980	17.3	8,893	6.4	2,976	0.1	1,080	0.7	2,423	0.7	883	0.6	
Orissa	4,999	0.7	77	0.3	2,259	0.3	10	0.04	...	...	...	...	104,258	14.9	1,673	7.5	16,521	2.4	673	3.0	4,506	0.6	379	1.7	
Bengal	30,949	0.6	1,761	0.5	26,823	0.5	1,321	0.4	...	...	...	...	760,480	15.6	15,006	4.2	48,813	1.0	7,987	2.3	77,806	1.6	19,180	5.4	
C. P.	982	0.1	155	0.1	240	0.02	220	0.1	970	0.07	32	0.02	262,611	17.8	19,748	10.8	28,992	2.0	4,769	2.6	37,685	2.5	7,833	4.3	
Bombay	10,332	0.7	660	0.2	949	0.1	861	0.2	454	0.03	52	0.01	144,509	9.2	19,621	5.3	21,755	1.4	6,339	1.7	77,973	5.0	33,514	9.1	
Sind	1	0.0	1	0.0	642	0.2	156	0.2	1	0.0	15	0.02	24,638	7.1	2,772	3.7	147	0.04	1,030	1.4	4,372	1.3	4,726	6.8	
Madras	20,168	0.5	3,139	0.8	1,919	0.04	527	0.1	877	0.02	250	0.06	269,457	6.0	26,237	6.7	67,322	1.6	16,954	4.3	67,436	1.6	23,470	7.3	
Coorg	1	0.0	...	...	9	0.06	...	...	8	0.05	...	...	3,386	21.8	85	9.0	96	0.6	47	5.0	106	0.7	117	12.4	
Assam	5,412	0.7	28	0.1	2,153	0.3	34	0.2	...	...	...	...	108,236	13.2	1,139	5.4	12,375	1.5	507	2.4	6,225	0.8	477	2.3	
Ajmer-Merwara	...	...	...	...	524	1.3	71	0.4	...	...	...	...	10,262	25.2	1,175	6.4	8	0.02	562	3.1	0	0.02	2,930	15.9	

O.—DEATHS FROM CHOLERA FROM 1905 TO 1937.

Year.	British N.-W. Punjab.			Delhi.	U. P. Bihar Orissa.			Bengal.			C. P. Bombay. Sind.			Madras. Coorg. Assam. Burma. Ajmer- Mor- putana. India. and.			Central Hydr. Mysore.			Indian States.
	India.	P. P.																		
1906—1909.	2,374,385	3,545	20,354	324	399,144	555,350	...	677,810	61,011	80,644	...	422,058	410	95,927	44,897	285	5,920	13,300	2,227	16,900
1910—1914.	4,767,770	5,421	17,643	508	331,970	394,482	...	451,025	73,258	96,929	...	230,444	254	81,007	19,800	74	6,219	25,806	9,210	17,672
1915—1919.	3,998,749	5,557	25,080	242	346,359	598,802	...	453,361	110,908	97,006	...	321,297	191	99,088	38,713	942	7,970	15,052	26,047	13,062
1920—1924	1,069,136	4,390	22,843	781	223,540	229,512	...	276,456	72,080	25,793	...	131,846	34	54,379	21,805	79	3,931	9,826	9,254	8,023
1925	115,645	116	3,043	50	7,658	17,336	...	34,270	124	57	...	44,815	4	6,233	1,982	...	...	43	22	...
1926	138,151	...	87	13	6,166	27,268	...	59,106	4,565	73	...	24,407	2	10,275	6,182	2	4	209	26	4
1927	304,740	2	11,236	16	28,285	49,022	...	113,377	16,311	26,153	...	35,334	...	15,392	4,528	4	1,367	2,584	8,913	1,367
1928	351,305	...	2,034	34	44,941	77,103	...	139,245	12,198	6,881	...	57,077	...	6,915	7,209	68	1,371	7,520	4,314	413
1929	385,434	30	2,309	193	50,924	104,034	...	81,090	6,168	9,084	...	25,846	1	7,705	7,970	20	722	1,155	450	140
1930	387,322	449	1,181	8	61,334	155,215	...	54,903	23,250	15,142	...	18,790	...	6,332	661	41	2,101	11,105	18,309	535
1931	220,999	106	391	61	31,113	40,943	...	79,073	14,135	13,616	...	30,232	110	5,533	534	32	294	1,411	5,053	6,385
1932	67,319	70	614	4	9,734	9,348	...	33,910	864	1,353	...	5,278	...	4,971	1,032	11	122	168	71	83
1933	68,318	...	160	...	1,915	17,514	...	29,242	2,152	7,797	...	3,851	...	5,508	179	...	35	642	4,838	90
1934	199,708	...	178	19	31,903	57,289	...	50,742	27,329	11,362	...	18,158	...	1,004	822	4	909	4,421	4,951	346
1935	217,462	245	714	181	10,412	64,876	...	59,005	20,140	11,235	...	35,456	...	7,436	6,858	4	33	1,943	10,553	1,407
1936	159,720	68	1,762	48	6,768	6,070	7,977	76,160	10,691	11,304	8	34,117	2	3,816	984	21	776	604	9,065	1,793
1937	99,954	24	105	...	6,341	13,949	5,976	32,710	1,107	10,992	2	23,307	1	5,449	†	...	...	1,042	2,351	4,842

* Excluding Burma.

† Burma was separated from India since April 1937.

TABLE G.—DEATHS AND RATES P. M. FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.			Death rate p. m.			Deaths in children.			Percentage of deaths to total mortality from smallpox.		
	R.	U.	Total.	R.	U.	Total.	Under 1 year.	1-10 years.	Total.	Under 1 year.	1-10 years.	Total.
BRITISH INDIA	43,812	5,998	54,810	0.2	0.2	0.2	7,689	14,945	22,634	14.0	27.3	
N.-W. P. P.												
Punjab	656	317	973	0.3	0.9	0.4	248	609	857	25.6	62.6	
Delhi	3,342	649	3,991	0.2	0.2	0.2	1,480	1,821	3,301	37.1	45.6	
	9	634	643	0.04	1.3	1.0	244	359	603	37.9	55.8	
U. P.	2,416	784	3,200	0.06	0.1	0.00	933	1,084	1,967	29.2	32.3	
Bihar	7,071	414	7,485	0.2	0.3	0.2	453	798	1,256	6.1	10.7	
Orissa	2,259	10	2,269	0.3	0.04	0.3	297	391	688	11.8	17.2	
Bengal	26,628	1,321	27,944	0.5	0.4	0.5	2,414	7,452	9,866	8.6	26.7	
C. P.	240	200	440	0.02	0.1	0.03	170	224	394	37.0	43.6	
Bombay	949	861	1,810	0.1	0.2	0.09	440	804	1,244	24.3	44.4	
Sind	642	156	798	0.2	0.2	0.2	123	401	529	18.0	50.3	
Madras	1,919	527	2,446	0.4	0.1	0.05	677	713	1,390	27.7	29.1	
Coorg	9	...	9	0.06	...	0.05	3	6	9	33.3	66.7	
Assam	2,153	34	2,187	0.3	0.2	0.3	227	333	560	10.4	15.2	
Almer-Merwara	524	71	595	1.3	0.4	1.0	Not available	Not available	Not available	Not available	Not available	

TABLE H.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	4,738	5,789	6,749	3,650	9,415	6,434	3,680	1,905	1,395	1,092	1,840	3,423
N.-W. P. P.												
Punjab	57	26	31	18	27	37	60	30	40	99	177	371
Delhi	417	342	299	254	447	470	421	146	110	87	264	734
	97	129	125	126	87	50	13	8	...	1	...	7
U. P.	323	291	345	447	501	490	251	130	66	60	126	170
Bihar	474	794	796	1,160	1,433	1,033	620	265	121	104	219	416
Orissa	263	801	280	299	298	189	102	94	98	82	90	178
Bengal	2,442	3,208	3,977	5,254	5,242	3,331	1,647	765	497	330	629	822
C. P.	151	168	69	72	54	42	14	25	16	10	16	3
Bombay	151	170	229	290	260	166	117	72	43	30	67	215
Sind	38	36	36	87	112	66	81	67	57	25	58	135
Madras	262	247	276	259	233	162	183	199	144	131	163	187
Coorg	...	1	...	...	4	4	...	...	...	...	...	...
Assam	120	115	144	212	316	333	250	99	197	129	124	148
Almer-Merwara	58	61	112	142	106	41	21	5	6	4	7	37

TABLE M.—DEATHS AND RATES P. M. FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.			Rate p. m.			Reported deaths from pulmonary tuberculosis.					
	R.	U.	Total.	M.	F.	R.	U.	Total.	R.	U.		
BRITISH INDIA	332,430	154,889	487,319	276,151	211,168	1.3	6.0	1.8	2.0	1.6	39,856	29,680
N.-W. P.	1,539	1,466	3,005	1,789	1,216	0.7	4.3	1.2	1.3	1.1	†	291*
Punjab	43,667	15,290	58,957	33,195	25,762	1.9	4.5	2.3	2.3	2.2	9,951	2,428
Delhi	1,162	2,517	3,679	1,996	1,683	5.4	5.2	5.3	5.0	5.7	100	922
U. P.	7,521	37,107	44,628	23,925	20,703	0.2	6.3	0.9	0.9	0.8	331	5,304
Bihar	2,423	883	3,308	1,979	1,327	0.7	0.6	0.1	0.1	0.08	†	198*
Orissa	4,506	379	4,885	2,797	2,088	0.6	1.7	0.7	0.5	0.6	†	6*
Bengal	77,806	19,180	96,986	60,698	36,288	1.6	5.4	1.9	2.2	1.4	10,175	4,493
C. P.	37,685	7,833	45,518	26,536	18,982	2.5	4.3	3.7	3.2	2.3	1,067	460
Bombay	77,973	33,514	111,487	60,169	51,318	5.0	9.1	5.6	6.0	5.5	17,797	7,326
Sind	4,372	4,728	9,098	5,442	3,656	1.3	6.3	3.1	2.3	2.0	445	1,061
Madras	67,436	28,470	95,906	52,024	43,882	1.6	7.3	3.0	2.2	1.8	†	6,626*
Coorg	106	117	223	109	84	0.7	12.4	1.4	1.9	0.7	...	..
Assam	6,225	477	6,702	3,948	2,754	0.3	2.3	0.3	0.9	0.7	†	26*
Ajmer-Merwara	9	2,930	2,939	1,454	1,485	0.02	15.9	5.0	4.7	5.2	†	641*

* For municipalities only.

† Not available.

TABLE N.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	49,116	41,555	42,436	41,625	39,615	34,833	32,855	35,917	35,376	38,845	42,807	52,599
N.-W. P.	437	286	266	193	210	203	194	180	114	198	281	463
Punjab	7,182	8,826	5,304	4,608	4,712	4,414	3,514	3,455	3,882	3,760	4,566	7,141
Delhi	365	330	324	308	261	300	248	256	229	253	333	472
U. P.	4,362	3,450	3,697	4,317	4,493	3,915	2,837	2,970	2,951	3,216	3,639	4,761
Bihar	240	263	234	302	227	259	279	254	226	236	314	527
Orissa	464	371	427	394	394	335	353	401	373	394	448	528
Bengal	8,803	8,187	9,155	8,776	7,287	6,140	6,346	6,238	6,575	7,084	9,891	11,824
C. P.	4,362	3,674	3,791	4,139	3,539	3,318	2,693	3,323	3,578	4,177	4,740	4,684
Bombay	11,812	8,317	9,487	9,911	9,423	7,506	7,449	9,555	9,182	9,281	9,073	10,487
Sind	1,497	1,414	1,144	843	632	401	464	465	368	443	600	807
Madras	9,309	7,198	7,349	6,788	7,475	7,286	7,834	8,035	7,648	8,147	8,589	10,248
Coorg	6	23	19	9	14	24	21	27	23	18	14	25
Assam	524	471	510	638	535	559	479	551	529	594	646	657
Ajmer-Merwara	253	240	270	399	408	221	144	207	178	164	183	282

TABLE C.—QUININE AND CINCHONA FEBRIFUGE ISSUED BY THE PUBLIC HEALTH, MEDICAL, AND OTHER DEPARTMENTS IN THE VARIOUS PROVINCES OF BRITISH INDIA DURING 1937.

	Quinine.		Cinchona febrifuge.	
	Total issues in lbs.	Grains per head of population.	Total issues in lbs.	Grains per head of population.
British India†	33,793	1.1	8,667	0.3
N. W. F. P.	1,234	3.4	880	2.4
Punjab*	3,070	0.8	496	0.1
Delhi	267	2.8	104	1.0
U. P.	4,744	0.6	4,075	0.5
Bihar	2,166	0.4	75	0.02
Orissa	1,506	1.5	472	0.5
Bengal				
C. P.†	3,687	1.6	850	0.4
Bombay	6,105	2.2	402	0.1
Sind	899	1.5	285	0.5
Madras	5,305	0.8	738	0.1
Coorg	775	33.0	231	9.8
Assam	3,923	3.3		
Ajmer-Merwara	115	1.4	62	0.7

* In addition, quinine worth Rs. 40 was sold to the villagers.

† Excluding Hoshangabad District

‡ Excluding Bengal.

Appendix III

relating to

Section III.

TABLE A.—MATERNAL DEATH RATES PER 1,000 LIVE-BIRTHS
PLUS STILL-BIRTHS RECORDED IN CERTAIN TOWNS.

		1937.		1937.	
		Deaths.	Rate. p. m.	Deaths.	Rate. p.m.
<i>North-West Frontier Province.</i>					
Dera Ismail Khan . . .		9	5.4	Etawah	19 7.3
Peshawar		20	6.1	Budaun	11 5.5
				Amroha	14 5.2
<i>Punjab.</i>				Sambhal	9 3.6
Bhiwani		12	6.9	Dehra Dun	20 10.4
Rohtak		5	3.6	Hathras	21 9.0
Panipat		1	0.6	Jaunpur	5 3.7
Ambala		10	6.7	Pilibhit	23 12.0
Jullundur		7	1.8	Muzaffarnagar	8 5.5
Ludhiana		2	0.6	Bahraich	14 8.2
Ferozepore		1	0.7	Hardwar Union	22 15.7
Lahore		123	8.5	Khurja	22 13.8
Kasur		2	1.5		
Amritsar		79	7.5	<i>Bihar.</i>	
Batala		3	1.7	Patna	6 2.5
Sialkot		5	1.3	Bihar	
Gujranwala		7	3.3	Gaya	117 41.8
Rawalpindi		5	1.4	Arrah	
Lyallpur		19	9.4	Chapra	6 4.1
Jhang-Maghiana		2	1.1	Muzaffarpur	21 20.8
Multan		55	10.4	Darbhanga	
<i>Delhi Province.</i>				Monghyr	10 6.9
Delhi City		68	3.9	Jamalpur	
New Delhi		10	4.0	Bhagalpur	
<i>United Provinces.</i>				Ranchi	1 1.3
Lucknow		7	0.5	Jamshedpur	
Cawnpore		112	8.7	<i>Orissa.</i>	
Agra		70	5.4	Berhampur	25 16.3
Benares		160	12.4	Cuttack	19 22.0
Allahabad		90	10.4	Puri	9 10.1
Bareilly		23	3.5	<i>Bengal Presidency.</i>	
Moradabad		58	9.7	Burdwan	19 27.1
Meerut		40	9.2	Asansol	11 11.0
Koili-Aligarh		27	6.7	Bankura	7 21.5
Shahjahanpur		34	11.0	Midnapur	16 19.5
Saharanpur		43	10.6	Hooghly-Chinsura	8 6.4
Jhansi		25	6.3	Serampur	5 5.4
Mirzapur-Bindhachal		26	8.5	Howrah	47 7.1
Muttra		19	6.0	Bally	1 1.9
Fyzabad-Ajodhya		26	13.8	South Suburban	6 5.8
Gorakhpur		20	7.7	Garden Reach	9 8.2
Farrukhabad-cum-Fatehgarh		23	9.6	Baranagar	11 11.6
				Kamarhati	5 9.2

TABLE A.—*contd.*

1937.				1937.				
		Deaths.	Rate.			Deaths.	Rate.	
		p. m.				p. m.		
<i>Bengal Presidency—contd.</i>				<i>Sind.</i>				
Titagarh	4	4.2	Karachi	93	6.5			
Naihati	3	8.2	Hyderabad	58	13.7			
Bhatpara	27	12.7	Sukkur	32	12.2			
			Shikarpur	44	19.3			
Calcutta	111	3.8	<i>Madras Presidency.</i>					
Sirajganj	13	19.8	Vizagapatam	23	9.3			
Dacca	65	10.7	Vizianagram	17	8.8			
Narayanganj	11	8.2	Cocanada	22	10.5			
Mymensingh	5	11.8						
Barisal	3	4.4	Rajahmundry	41	16.6			
Chittagong	27	19.0	Ellore	20	8.3			
Comilla	6	21.7	Bezwada	51	18.8			
			Masulipatam	29	11.1			
			Guntur	66	22.4			
			Tenali	11	8.3			
<i>Central Provinces.</i>				Nellore	57	22.9		
Nagpur City	104	9.0	Madras	289	9.1			
Nagpur Civil Station			Conjeeveram	43	15.7			
Jubbulpore	34	5.5	Saidapet	2	1.7			
Saugor	9	3.6	Cuddalore	44	18.0			
Khandwa	22	14.6	Trichinopoly	69	13.4			
Burhanpur	34	16.6						
Raipur	29	14.9	Tanjore	61	20.8			
Amraoti	16	6.4	Kumbakonam	33	11.7			
Akola	24	10.0	Negapatam	34	18.7			
			Mayavaram	15	13.8			
			Madura	94	10.8			
			Dindigul	16	7.2			
<i>Bombay Presidency.</i>				Virudhunagar	18	13.8		
Bombay	162	4.3	Srivilliputtur	15	12.7			
Jalgaon	22	14.1	Tuticorin	28	12.2			
Dhulia	4	2.9	Tinnevely	25	11.3			
Nasik	3	2.5	Palamcotah	31	27.7			
Bandra	..	..	Vellore	42	13.1			
Kurla	..	..	Salem	38	10.2			
Surat	37	5.8	Coimbatore	62	15.1			
Broach	35	14.8	Erode	20	19.1			
Nadiad	16	9.4	Kurnool	13	7.6			
Ahmedabad	78	4.3	Bellary	33	14.6			
Poona	31	5.5	Adoni	18	13.7			
Sholapur	55	7.7	Mangalore	35	13.6			
Ahmednagar	13	5.8	Calicut	65	13.4			
Bijapur	1	0.6	Palghat	18	8.6			
Belgaum	11	8.5	Cannanore	14	10.8			
			Tellicherry	15	13.0			
Hubli	14	6.2	<i>Ajmer-Merwara.</i>					
Godhra	4	4.6	Ajmer	46	8.4			
Dharwar	7	4.6						

TABLE B.—MATERNITY AND CHILD WELFARE CENTRES IN RURAL AND URBAN AREAS.

[illegible]

APPENDIX III—C.

SCHEDULE FOR TYPE I ENQUIRY.

Serial No.	Name.	Residence.	Age in years.	Religion and caste if Hindu.	Name of father husband	Occupation of father or husband.	Date of death.	Registered cause of death.	Did death occur during pregnancy? Yes/No.	Did death occur during labour or abortion? Yes/No.	Did death occur within 3 months of labour or abortion. Yes/No.	State Period. Place of delivery. (a) Hospital (b) Home	Attendant at delivery : doctor, midwife, trained dai, untrained dai, relatives.	Number of pregnancy, 1st, 2nd, 3rd, etc.	Ascertained cause of death.	Investigator's remarks.
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Note.—All the columns are to be filled in by the registrar except the last two, which are to be filled in by the investigator.

APPENDIX III-D.

SCHEDULE FOR TYPE II AND III ENQUIRIES.

The schedules should be printed in books of 25 forms and the following directions should be bound with the forms as the first page of the book.

DIRECTIONS FOR FILLING IN FORMS.

Definition of "maternal death."

For the purpose of this enquiry a "maternal death" is any death which takes place during pregnancy or labour (or abortion), or within 8 weeks after delivery, or later if this illness originated during pregnancy, childbirth or the puerperium (4 weeks after delivery).

This definition therefore includes deaths from intercurrent diseases associated with pregnancy or the puerperium.

The paragraph headed, "Abortion, ectopic, moles", is only to be filled in when pregnancy was of less than 7 months duration.

The paragraph headed, "Summary of labour" should be left blank only when death occurred before labour began.

In the four succeeding paragraphs, "Haemorrhage", "Toxaemias of pregnancy", "Difficult labour" and "Severed anaemia" the question "yes or no" should be answered in each paragraph. If "yes" the subsequent questions in that paragraph should be answered as far as information can be ascertained.

The questions regarding puerperal sepsis and those in the following paragraphs should be answered in all cases, except those of the last paragraph below the words "not to be filled in by the field worker". This part of the form is for office use in the final analysis of the forms.

If any question cannot be answered a question mark thus "?" should be used to show that the information was not available.

FORM FOR ENQUIRY.—TYPES II AND III.

Enquiry serial number
 Name
 Address
 Family poor
 Home } Clean
 } well ventilated
 } overcrowded
 Religion
 Age
 Date of confinement (if delivered)
 Died undelivered (yes or no)
 Duration of pregnancy (in months)
 Registered cause of death (if available)
 By whom certified

Province District Village Town
 Name of husband
 (or householder).
 Occupation of husband
 middle class rich
 dirty.
 not ventilated.
 not overcrowded.
 Caste (if Hindu).
 Date of death.

Previous obstetric history.

Serial number.	Full term, premature or abortion.	Complications of pregnancy, labour or puerperium. yes or no.
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Course of pregnancy.

Purdah, yes no.

Health before pregnancy (good or bad).

Health during " " " "

Were any of the following symptoms noticed during pregnancy? State duration in each case.

Difficulty in walking (osteomalacia) yes no. Pallor (anaemia) yes no.

Swelling of feet, face or whole body yes no.

Diarrhoea yes no. Excessive vomiting yes no.

Constipation yes no. Other symptoms.

Advice followed.

yes or no.

(d) no trained attendant.

Interval between last examination and death
or delivery.....

Baby born alive dead condition at report

By whom ?

Toxaemias of pregnancy.

1. Eclampsia (yes or no).
 Odema present Headache Vomiting
Fits, began before, during or after delivery
 Was albumen found in urine before or at time of *fits* ?
 Blood pressure
 Treatment
 Method of delivery
 2. Other toxaemias (albuminuria, hyperemssis, acute yellow atrophy.)
 State symptoms and signs on which diagnosis based
 Urine Treatment
-

Difficult labour. (yes or no).

- What was probable cause of difficulty ?
- Was difficulty expected ?
- Was contraction present ? Osteomalacia
- Was abnormal presentation present ?
- Treatment.* Operative Non-operative
- By whom was treatment given ? Where ?
- Anaesthetic used ?
-

Severe anaemia (yes or no)

- Symptoms and their duration
- Blood reports
- Treatment given in pregnancy and after
- Was anaemia the only cause of death found ? if other
 state
-

Puerperal sepsis (excluding sepsis after abortion) (yes or no)

- Was labour normal or complicated ?
- Was any other disease present ?
- Who made vaginal examination ? Probable number of
 examinations Was any antiseptic used ?
- State which
- Where was the patient examined ? Where delivered ?
- Where treated after delivery ? Was there any perineal
 tear ? Treatment
-

Associated diseases.

- Was any disease (such as tuberculosis, diarrhoea, dysentery, malaria, pneumonia etc.,)
 other than a complication of pregnancy itself, the cause of death, or a contributing
 cause ?
- If so, state the disease and symptoms and their duration
-

Comments by the medical investigator.

Which one (or more) of the following causes contributed in your opinion to the death :
(give reasons).

1. Lack of prenatal care
2. Lack of skill or error of judgment.....
3. Lack of facilities for proper treatment (*e. g.*, transport, hospital, beds etc.)
4. Neglect of the patient's relatives to take or follow advice
5. Other causes

Date

Signature.

Not to be filled in by field workers.

Final remarks by investigator.

Causes of death.

International List :	140	141	142	143	144	145	146	147
148	149	150	Anaemia					
					Associated Diseases.			

Signature.

APPENDIX III—E.

PROVISION FOR INSTITUTIONAL MIDWIFERY.

District..... Village..... Town Date..... Total births per annum.....

1	2	3	4				6	7		8	9				10
Name of institution.	State whether (a) General hospital (b) Maternity hospital (c) Maternity home	Are prenatal clinics conducted ?	No. of obstetric beds.				No. of resident medical staff.	No. of mid-wives for maternity wards.		Total deliveries in hospital per annum.	Total maternal deaths.				Remarks.
			Antenatal	Maternity	Postnatal	Total.	No. of beds per 100 births.			Full time.	Premature.	Abortions, etc.	Total.		
									Trained.						
									Licentiates.						

APPENDIX III—F.

STAFF AVAILABLE FOR DOMICILIARY MIDWIFERY (EXCLUDING STAFF ATTACHED TO INSTITUTIONS.)

District.....Date.....Total births per annum.....
 Village.....Town.....

1				2		3		4	5	6	7	8
No. of doctors employed by				No. of midwives and assistant midwives.		No. of trained dais.		Total trained staff.	No. of deliveries conducted by trained staff.	Deliveries conducted by trained staff as percentage of total births.	No. of births per trained midwife or day (Total births per annum divided by the number of trained staff).	No. of maternal deaths in domiciliary practice.
Local bodies.	Voluntary organisations.		Total.	Salaried.	In private practice.	Salaried.	In private practice.					
Graduates	Licentiates	Graduates	Licentiates	Local body	Voluntary organisations							

Appendix IV

relating to

Section IV.

TABLE A.—EXPENDITURE ON PUBLIC HEALTH DURING 1937-38.

	Total.	Public Health establishment.	Grants for public health purposes.	Transfer to the fund for Development of Rural water supply.	Expenses in connection with Epidemic Diseases.	Bacteriological Laboratory.	Pasteur Institutes.	Works.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Total	1,86,18,581	64,83,846	47,40,826	18,00,000	19,44,980	11,33,251	2,56,497	22,59,181
Central Govt.	19,37,437	4,31,791	2,75,305	..	2,94,217	2,23,728	1,607	7,60,789
N.-W. F. P.	1,19,850	98,088	5,036	..	16,726	..	..	14,365
Punjab	16,58,072	7,67,609	7,16,484	..	1,04,508	25,322	29,784	94,304
U. P.	22,15,690	14,64,886	4,74,603	..	1,81,897	..	..	..
Bihar	12,17,289	4,78,858	2,80,365	..	1,31,193	28,081	19,441	2,79,351
Orissa	2,43,353	1,04,883	77,128	..	27,867	15,447	245	22,783
Bengal	30,13,933	6,28,928	18,04,675	..	4,19,168	81,092	41,381	39,689
C. P.	3,89,389	95,120	52,359	..	2,39,026	2,884	..	..
Bombay	23,72,277	6,59,655	1,98,497	..	1,60,140	3,18,945	13,834	10,21,206
Sind	2,32,941	1,36,492	58,980	..	35,968	..	1,501	..
Madras	43,61,327	12,91,058	6,63,810	18,00,000	1,42,379	4,25,308	35,142	3,630
Coorg	18,304	9,746	..	..	3,896	..	..	4,562
Assam	7,82,719	3,16,732	1,33,584	..	1,87,995	12,444	1,13,562	18,402

TABLE B.—DISTRIBUTION OF HEALTH STAFFS IN RURAL AND URBAN AREAS.

	Rural Areas.									
	Medical Officers of Health.				Epidemic Staff.	Sanitary and Health Inspectors.	Vaccinators.		School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)				M.	F.		
	Whole time.	Part time.	Whole time.	Part time.						
Total	142	2	93	1	691	1,227	6,309	66	17	1,221
N. W. F. P.	...	...	...	...	2*	...	26	...	...	2*
Punjab	25	...	12	...	...	48	422	2	...	490
Delhi	1	1	...	...	...	6	3	...	6	18
U. P.	43	1	33	...	45	150	821	...	...	...
Bihar	9	...	8	...	201	85	945	1	8	...
Orissa	4	...	2	...	20	34	270	5	2	133
Bengal	28	...	17	1	222	589	2,155	48	2	408
C. P.	...	...	...	...	43	...	274	...	†	35
Bombay	2	...	...	...	63	7	303	...	...	50
Sind	...	...	1	...	...	1	75	1	...	...
Madras	26	...	19	...	35	305	587	8	...	...
Coorg	1	...	1	...	...	2	4	...	...	...
Assam	...	...	...	...	60	...	414	1	...	...
Ajmer-Merwara.	...	...	...	...	...	...	10	...	...	...

* appointments sanctioned for rural as well as for urban areas.

† There are no officers appointed particularly for the medical inspection of schools. The work is done by the Sub-Assistant Health Officers on epidemic duty and Assistant Medical Officers incharge of branch dispensaries.

Urban Areas.										
Total	Medical Officers of Health.				Sanitary and Health Inspectors.	Vaccinators.		Inspector of Vaccination.	School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)			M.	F.			
	Whole time.	Part time.	Whole time.	Part time.						
	136	13	102	27	1,073	920	37	85	63	3,639
N.-W. F. P.	1	...	1	...	9	6	1	6	6	...
Punjab	16	9	3	24	143	155	8	...	17	3,251
Delhi	1	3	...	...	16	12	...	...	7	19
U. P.	21	...	13	...	176	175	...	...	13	...
Bihar	8	1	3	2	92	75	2	9	...	30
Orissa	2	...	...	1	9	10	1	3	...	9
Bengal	24	...	...	...	105	145	11	6	4	127
C. P.	2	...	1	...	75	82	...	...	†	3
Bombay	28	...	51	...	106	41	...	1	8	217
Sind	6	...	...	...	22	10	2	1	...	...
Madras	26	...	30	...	296	171	12	17	8	...
Coorg	...	...	...	...	2	2	...	...	...	...
Assam	1	...	...	...	13	50	...	41	...	15
Ajmer-Merwara	1	...	...	...	14	7	...	*1	...	18

* For rural and urban areas.

† There are no officers appointed particularly for the medical inspection of schools. The work is done by the Sub-Assistant Health Officers on epidemic duty and Assistant Medical Officers incharge of branch dispensaries.

Appendix V

relating to

Section VI.

TABLE A.—VACCINATION OPERATIONS PERFORMED IN BRITISH INDIA AND IN DIFFERENT PROVINCES DURING 1937-38.

Province.	Population.	Operations-performed.		Percentage of success.		Children successfully vaccinated.		Total cost.	Average cost per successful case.			Rate of Percentage successful of annual vaccinations per successfully vaccinated population.	
		Total.		P.	R.	Under 1 year.	1 to 6 years.		Rs.	Rs. A. P.			
		P.	R.							0	3		58
British India	256,334,322	10,419,986	14,913,397	25,333,383	97	56	4,354,080	4,290,543	3,035,207	0	3	58	46
N.W. P. F.	3,762,078	180,090	194,538	375,318	90	82	85,835	65,757	31,450	0	1	7	83
Punjab	23,400,267	1,065,215	4,708,915	5,774,130	90	67	801,450	161,078	4,36,928	0	2	0	148
Delhi	636,346	24,278	63,008	87,286	97	59	18,555	3,240	12,320	0	3	13	70
O. P.	48,408,703	1,018,490	266,616	1,885,106	97	43	1,014,028	451,064	3,90,102	0	3	9	34
Bihar	32,371,434	900,780	378,909	1,369,749	98	53	273,292	682,325	50,673	0	0	9	34
Orissa	8,009,559	230,196	424,763	654,959	95	00	67,355	121,479	61,780	0	8	46	23
Bengal	50,114,002	3,074,319	5,524,202	8,599,081	88	34	424,414	1,098,173	4,87,388	0	1	0	91
C. P.	15,323,080	520,668	110,004	639,657	97	33	384,445	92,436	2,93,482	0	6	3	34
Bombay	17,907,050	641,479	547,152	1,188,631	100	44	454,905	139,052	4,16,020	0	11	2	31
Sind	3,887,070	138,570	105,987	244,557	100	24	67,986	54,092	1,05,386	0	12	0	60
Madras	44,432,597	1,466,503	2,193,219	3,659,722	97	21	667,275	568,602	7,12,995	0	7	0	37
Goorg	103,327	3,241	4,191	7,432	97	52	693	2,053	11,408	1	8	2	32
Assam	9,247,857	488,017	387,890	835,907	92	58	73,879	251,213	1,97,197	0	3	4	55
Ajmer-Marwara	560,292	27,065	3,883	30,948	99	93	19,438	4,070	8,128	0	4	4	54

R = Revaccinations.

P = Primary.

P—Primary.

R—Re-vaccinations.

Appendix VI
relating to
Section VII.

TABLE A.—NUMBER OF TOWNS HAVING PROTECTED WATER SUPPLIES IN DIFFERENT PROVINCES.

1	BRITISH INDIA	Towns having a population of over 50,000.		Towns having a population of 30,000—50,000.		Towns having a population below 30,000.		Total.		
		No. Towns having of a protected towns. water supply.		No. Towns having of a protected towns. water supply.		No. Towns having of a protected towns. water supply.		No. of towns.	Aggregate population.	Population of towns included in col. 10.
		No.	Towns having of a protected towns. water supply.	No.	Towns having of a protected towns. water supply.	No.	Towns having of a protected towns. water supply.			
		2	3	4	5	6	7	8	9	11
		76	63	33	46	1,067	135	1,228	23,546,358	13,686,205
	N.W.F.P.	1	1	1	1	15	6	17	299,284	206,293
	Punjab	3	2	10	4	162	29	180	2,534,154	1,532,426
	Delhi	2	2	...	...	4	3	6	484,278	485,018
	U.P.	17	12	13	4	407	9	437	5,429,664	1,805,320
	Bihar	6	5	6	3	57	2	69	1,465,138	760,243
	Orissa	1	...	2	2	5	...	8	216,806	75,318
	Bengal	5	5	17	14	96	27	118	2,370,723	1,471,854
	C.P.	2	2	7	4	103	3	112	1,879,546	550,338
	Bombay	7	7	13	5	112	13	131	3,806,892	2,649,489
	Sind	4	3	15	...	23	1	27	684,857	439,607
	Madras	22	18	15	...	46	15	38	3,715,160	2,621,028
	Coorg	...	...	...	...	2	1	2	9,527	5,995
	Assam	...	...	...	...	31	10	31	229,825	111,870
	Ajmer-Merwara	1	...	...	...	4	1	6	180,199	21,397

Appendix VII

relating to

Section VIII.

List of Scientific Papers by Research Workers under the Government of India, the Indian Research Fund Association, Provincial Governments, and Indian States published during 1937.

A.—(i) PAPERS PUBLISHED IN THE INDIAN JOURNAL OF MEDICAL RESEARCH (I. J. M. R.)

Ahmad, B., and Guha, R. C.

Some observations on the experimental production of cataract. (Volume XXV, No. 2).

Ahmad, B., Mullick, D. N., and Mazumdar, B. N.

The carotene content of some common Bengali foodstuffs. (Volume XXIV, No. 3).

Aykroyd, W. R., and Krishnan, B. G.

Diet surveys in South Indian villages. (Volume XXIV, No. 3).

The state of nutrition of school children in South India, Part III. Diet and deficiency disease in residential hostels. (Volume XXIV, No. 3).

The effect of skimmed milk, soya bean, and other foods in supplementing typical Indian diets. (Volume XXIV, No. 4).

A diet survey repeated at another season. (Volume XXV, No. 1).

The deficiencies of the South Indian diet. (Vol. XXV, No. 2).

Aykroyd, W. R., and Wright, R. E.

Red-palm oil in the treatment of human keratomalacia. (Volume XXV, No. 1).

Bagchi, K. N., and Ganguly, H. D.

Lead in urine and faeces. (Volume XXV, No. 1).

Basir, M. A., and Ramabhadran, T. S.

A study of human parotid saliva. (Volume XXIV, No. 3).

Basu, C. C.

Notes on a new strain of actinomycetes obtained by blood culture. (Volume XXV, No. 2).

Basu, K. P., and Basak, M. N.

Biochemical investigations on different varieties of Bengal rice. Part IV. Biological value of proteins of Aman and Aus rice and of their polishings. By the balance-sheet and growth methods. (Volume XXIV, No. 4).

Biochemical investigations on different varieties of Bengal rice. Part V. Extraction and chemical analysis of proteins of rice of both Aman and Aus varieties. (Volume XXIV, No. 4).

Metabolism of Amino acids in heart and lung tissues. (Volume XXIV; No. 4).

Basu, K. P., Nath, M. C., Ghani, M. O., and Mukherjee, R.

Extraction and chemical analysis of the proteins of green gram (*Phaseolus mungo*) Lentil (*Lens esculenta*), and *Lathyrus sativa* (Khesari). (Volume XXIV, No. 4).

Basu, K. P., Nath, M. C., and Mukherjee, R.

Biological value of proteins of soya bean, field pea, and *Lathyrus sativa*. By the balance-sheet and growth methods. (Volume XXIV, No. 4).

Basu, N. M.

On the actions of Neo-stibosan, Urea-stibamine, and Histamine on frog's heart. (Volume XXIV, No. 4).

Bhatnagar, S. S., Freeman, J. F., and Dhillon, C. S.

The nature of immunity resulting from T. A. B. inoculation. A study of 'O' agglutinins in the sera of inoculated human subjects and their immunological significance (Volume XXIV, No. 3).

Bhatnagar, S. S., Freeman, J. F., and Gera, G. C.

The agglutinogenic and agglutinating activities of *B. paratyphosus* A. (Volume XXIV, No. 3).

Chakraborty, R. K., and Guha, B. C.

Ascorbic-acid oxidase in plant and animal tissues. (Volume XXIV, No. 3.)

Chopra, R. N., and Basu, B. C.

A preliminary report on the effect of anti-malaria drugs upon the infectivity of the patients to the mosquitoes. (Volume XXV, No. 2).

Chopra, R. N., Das, N. N., and Mukherjee, S. N.

The action of Ajmaline on nerve impulses. (Volume XXIV, No. 4).

Studies on the aetiology of epidemic dropsy. Effect of plasma on tissue culture and chorio-allantoic membranes of the chick. (Volume XXV, No. 1).

Chopra, R. N., and De, N. N.

A preliminary note on the presence of a histamine-like body in the aqueous humour in glaucoma associated with epidemic dropsy. (Volume XXV, No. 1).

Chopra, R. N., Ghosh, S., and Dutt, A. T.

Some inorganic preparations of the Indian indigenous medicine. Part IV. *Raupya bhasma* (reduced silver). (Volume XXIV, No. 4).

Some inorganic preparations of the Indian indigenous medicine. Part V. *Swarna bhasma* (reduced gold) and *gold kushl*. (Volume XXIV, No. 4).

Chopra, R. N., Mukherjee, S. N., and Chowhanm, J. S.

Physical changes in blood in *vigo* after injection of venom from Indian cobra (*Naia naia vel tripudians*) into monkeys. (Volume XXV, No. 1).

Chopra, R. N., and Roy, A. C.

Observations on the blood-lipoid changes in opium addicts. (Volume XXV, No. 1).

On the estimation of Atebrin in tissues. (Volume XXV, No. 2).

Covell, G.

Notes on antirabic immunization : A correction. (Volume XXIV, No. 3).

Cunningham, J., and Fraser, A. G. L.

Further observations on Indian relapsing fever. Part III. Persistence of Spirochaetes in the blood and Organs of Infected Animals. (Volume XXIV, No. 3).

Further observations on Indian relapsing fever. Part IV. Re-infections and super-infections. (Volume XXIV, No. 3).

Dastur, N. N., and Giri, K. V.

Relative digestibilities of edible fats by castor-seed and pancreatic lipases. (Volume XXV, No. 2).

De, N. K.

The spectrophotometric method of assaying vitamin A and carotene with further data on the vitamin-A activity of Indian foodstuffs. (Volume XXIV, No. 3).

The assimilation of vitamin A and carotene by rats from some common foods with a note on the conversion factor I. U./E., proposed by the International Vitamin Conference. (Volume XXIV, No. 3).

The possible use of red-palm oil in supplementing the vitamin-A activity of common vegetable oils. (Volume XXV, No. 1).

The absorption of vitamin A and carotene and the isolation of vitamin A from associated pigments. (Volume XXV, No. 1).

De, S. P., and Basu, U. P.

Action of p-Amino-benzene-sulphonamide against streptococcal infections in mice. (Volume XXV, No. 2).

Glastaun, G.

A study of ossification as observed in Indian subjects. (Volume XXV, No. 1).

Ganguly, S. N.

Hæmolysis by the venom of the Indian cobra (*Naja Tripudians*). (Volume XXIV, No. 4).

Ghosh, B. N., and De, S. S.

The migration of the toxic constituents of cobra (*Naja Naja*) venom at various pH in an electric field. (Volume XXIV, No. 4).

Ghosh, B. N., and Ray, N. N.

Adsorption of antigens by antibodies or *vice versa*. Part III. The effect of electrolytes on the rate of flocculation of toxin-antitoxin mixtures of diphtheria and tetanus. (Volume XXIV, No. 3).

Adsorption of antigens by antibodies or *vice versa*. Part IV. The effect of different factors on the flocculation of concentrated antitoxins of tetanus and diphtheria in the presence of their respective toxins. (Volume XXV, No. 2).

The Danysz phenomena in staphylococcal toxin-antitoxin reaction. (Volume XXV, No. 2).

Giri, K. V.

The stabilization of vitamin C by phosphophosphate. (Volume XXV, No. 2).

Hardikar, S. W., and Mohiuddin, M. G.

Chemical and pharmacological examination of *Randia dumetorum*, N. O. Rubiaceæ. (Volume XXV, No. 1).

Krishnan, B. T.

Influence of histamine and acetyl-choline on intestinal movements. (Volume XXV, No. 1).

Lal, R. B., and Roy, S. C.

Investigations into the epidemiology of epidemic dropsy. Part I. Introductory notes and a historical survey. (Volume XXV, No. 1).

Investigations into the epidemiology of epidemic dropsy. Part II. A summary of field studies. (Volume XXV, No. 1).

Investigations into the epidemiology of epidemic dropsy. Part IV. Experiments to test the validity of infection theory in a semi-isolated community. (Volume XXV, No. 1).

Investigations into the epidemiology of epidemic dropsy. Part V. Feeding experiments on human volunteers. (Volume XXV, No. 1).

Lal, R. B., Roy, S. C. and Ghosal, S. C.

Investigations into the epidemiology of epidemic dropsy. Part III. Some laboratory studies on rice as the ætiological agent. (Volume XXV, No. 1).

Lowe, J. and Dharmendra.

A study of *M. lepræ muris* in tissue cultures and in chick-embryo medium. (Volume XXV, No. 2).

Maplestone, P. A., and Bhaduri, N. V.

Tænia solium and *Cysticercus cellulosæ* in India. (Volume XXV, No. 1).

Mehta, D. R.

Studies on typhus in the Simla hills. Part VIII. Ectoparasites of rats and shrews with special reference to their possible rôle in the transmission of typhus. (Volume XXV, No. 2).

Mukerji, B.

Action on smooth muscles of some ephedrine-like amines. (Volume XXV, No. 1).

Mulligan, H. W. (jointly with Taliaferro, W. H.)

The histopathology of malaria with special reference to the function and origin of the macrophages in defence. (*Indian Medical Research Memoir*, No. 29, May).

Napier, L. E., and Das Gupta, C. R.

Hæmatological studies in Indians. Part VI. Investigations in 100 cases of marked anæmia amongst tea-garden coolies. (Volume XXIV, No. 3).

Hæmatological studies in Indians. Part VII. The incidence and degree of anæmia amongst pregnant females of the coolie population. (Volume XXIV, No. 4).

Napier, L. E., and Billimoria, H. S.

Hæmatological studies in Indians. Part VIII. Analysis of the hæmatological findings in 52 cases of anæmia amongst pregnant tea-garden coolie women. (Volume XXV, No. 2).

Narasimhamurthy, G.

A chemical method for the examination of flavin in foodstuffs. (Volume XXV, No. 4).

Narasimhamurthy, G., and Ranganathan, S.

The nitrogen complex of Indian foodstuffs. Condiments: Part I. Black pepper (*Piper nigrum*). (Volume XXV, No. 2).

Niyogi, S. P., Patwardhan, V. N., and Chitre, R. G.

Balanced diets. Part I. (Volume XXIV, No. 3).

Radhakrishna Rao, M. V.

'Phrynoderma'—A clinical and histopathological study. (Volume XXIV, No. 3).

Studies on vitamin-A deficiency. Part II. Histopathology of the skin in human keratomalacia. (Volume XXV, No. 1).

Raja, K. C. K. E.

A forecast of population in India at the census of 1941. (Volume XXIV, No. 4).

Ranganathan, S., and Sankaran, G.

The excretion of vitamin C by human beings in South India. (Volume XXV, No. 1).

Ranganathan, S., Sundararajan, A. R., and Swaminathan, M.

Survey of the nutritive value of Indian foodstuffs. Part I. The chemical composition of 200 common foods. (Volume XXIV, No. 3).

Survey of the nutritive value of Indian foodstuffs. Part II. Changes in chemical composition brought about by cooking. (Volume XXV, No. 1).

Rao, M. N.

Gastric analysis in Indians. A study of 100 cases. (Volume XXIV, No. 4).

Read, W. D. B.

A note on the bacteriological findings in clinical cholera in Calcutta in relation to epidemiology. (Volume XXIV, No. 4).

Roy, D. N.

On the male terminalia of *Chrysomya megacephala* and *C. bezziana*. (Volume XXIV, No. 3).

Rudra, M. N.

Studies in vitamin C. The effect of cooking and storage on the vitamin-C content of foodstuffs. (Volume XXV, No. 1).

Sankaran, G., and Rajagopal, K.

Studies in carbohydrate metabolism. Part II. Effect of a high carbohydrate diet containing sugar on the glucose-tolerance curve in the albino rat. (Volume XXIV, No. 4)

Sankaran, G., and Ranganathan, S.

Migration of adrenaline in an electrical field. (Volume XXV, No. 1).

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VOLUME LXXII.

Andreasen, A. T.

Head injuries—a clinical lecture. (Page 552).

Bagchi, K. N.

Significance of florence test for seminal stains. (Page 90).

Bagchi, K. N., and Ganguly, H. D.

Arsenic in human tissues and excreta. (Page 477).

Banerjea, J. C.

Some observations on chrysotherapy in pulmonary tuberculosis. (Page 205).

Basu, U. P.

Treatment of tuberculous hæmoptysis by subcutaneous emphysema. (Page 241).

Bordia, N.

Oxygenation of the peritoneal cavity in the treatment of tuberculosis of the abdomen. (Page 233).

Bose, J. P.

Insulin anaphylaxis. (Page 465).

Chakraverti, J.

The clinical aspect of placenta prævia and its management in Indian conditions. (Page 9).

Observations on prolapse of the uterus and its management in India. (Page 521).

Chopra, R. N., Chaudhuri, R. N., and De, N.

Electrocardiographic changes in epidemic dropsy. (Page 1).

Chopra, R. N., Chaudhuri, R. N., and Sen Gupta, P. C.

Telerontgenography of the heart in epidemic dropsy. (Page 393).

Chopra, R. N., and Chopra, G. S.

The treatment of opium habit with lecithin and glucose. (Page 265).

Chopra, R. N., and Chowhan, J. S.

Cobra venom in therapeutics. (Page 339).

Chopra, R. N., Hayter, R. T. M., and Bhattacharya, S. N.

Radiological and laboratory investigations of chronic gastro-intestinal disturbances in the tropics. (Page 129).

Chopra, R. N., Hayter, R. T. M., and Sen, B.

A comparative study of the action of atabrin and atabrin-plasmochin combination on Indian strains of malaria. Part II. (Page 458).

Chopra, R. N., Sen, B., and Gupta, J. C.

Yatren in infection with Indian strains of *E. Histolytica* (chronic intestinal amœbiasis). (Page 348).

Chopra, R. N., Sen, B., and Roy, A. G.

Individual variations in the effectiveness of synthetic anti-malarial drugs (a preliminary note). (Page 131).

Collins, F. M.

The treatment of cervical glandular tuberculosis. (Page 230).

Cruickshank, M. M.

The denuded penis after operation for elephantoid scrotum. (Page 87).

Das Gupta, B. M.

Experimental investigation into the duration of tolerance to re-infection in monkey malaria. (Page 726).

Das Gupta, B. M., and Chopra, R. N.

The occurrence of Weil's disease in India. (Page 610).

Dhar, D. R.

A short note on the diagnosis of pulmonary tuberculosis. (Page 409).

Dharmendra.

Allergy. (Page 166).

Dutta, P. C.

Puerperal Sepsis: a review. (Page 17).

Organisation of a blood transfusion service in a district hospital. (Page 715).

Gharpure, P. V., and Gharpure, V. V.

The rarity of the male enterobius vermicularis. (Page 23).

Goodall, J.

Clinical study of sixty-three cases of oriental sore. (Page 3).

Greval, S. D. S.

Deeds of violence in India in 1935-36 and other crimes in which serology plays a part. (Page 81).

Fireside fantasies. (Page 312).

Gupta, J. C.

A syncopal form of angina pectoris (an electrocardiographical study). (Page 295).

Hamid, A.

Development of health education work in United Provinces. (Page 618).

Hance, J. B.

Experience with Russell's viper venom. (Page 76).

Hayes, S. N.

The operative treatment of vesico-and vesico-urethro vaginal fistulae by the vaginal route with case notes on thirty-three cases. (Page 282).

Hayward, E. W.

The mortality of operations for vesical calculus in India. (Page 78).

Iyengar, M. O. T.

Public health aspects of filariasis in India. (Page 300).

Jaswal, J. N.

The relation of systemic blood pressure to intra-ocular pressure. (Page 602).

Renal efficiency in glaucomatous patients. (Page 728).

Kamra, B. L.

Rheumatic fever in the Punjab. (Page 88).

Karamchandani, P. V.

Study of 110 cases of dengue fever in the Madras Penitentiary. (Page 532).

Kini, M. G., and Subba Rao, K. V.

The problem of cancer. (Page 677).

Kirwan, E. O. 'G.

Surgical treatment of non-paralytic squint. (Page 457).

Kutumbiah, P., and Ramchandra Rao, P.

Interatrial septal defect with mitral insufficiency of congenital origin. (Page 722).

Lal, R. B.

Fairs and festivals in India. (Page 96).

Lowe, J.

The epidemiology of leprosy. (Page 160).

Malik, S. A.

Spinal anaesthesia. (Page 609).

Mallick, S. M. K., and Singh, B.

Prognostic significance of icterus index in lobar pneumonia. (Page 538).

Maplestone, P. A.

The eggs of *tænia solium* and *tænia saginata*. (Page 149).

Maplestone, P. A., and Bhaduri, N. V.

Gnathostomiasis in human beings. (Page 713).

Maplestone, P. A., and Dey, N. C.

The treatment of pityriasis rosea. (Page 135).

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Further experience with tetrachlorethylene. (Page 650).

Millar, G. M., and Mohi-ud-din, G.

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Min Sein.

A case of hæmoglobinuria caused by Plasmochin taken as a prophylactic against malaria. (Page 86).

Mitra, S.

Anæmia of pregnancy. (Page 586).

Morrison, R. V., and Gollerkeri, P. G.

A malignant cystic hæmangio-blastoma of the cerebellum. (Page 528).

Mukerji, B.

Cyanide poisoning and its treatment with antidotes. (Page 353).

Napier, L. E.

Pulmonary tuberculosis and kala-azar: a fatal combination. (Page 242).

Anæmia in tea-garden labour forces. (Page 270).

Napier, L. E., Chaudhuri, R. N., and Rai Chaudhuri, M. N.

A stable solution of antimony for the treatment of kala-azar. (Page 462).

Napier, L. E., Chaudhuri, R. N., and Sen Gupta, P. C.

Hodgkin's disease of the plebstein type: some unusual findings. (Page 140).

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Nicholls, L.

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Structural changes in the parathyroids in vitamin deficiency. (Page 593).

Palit, A. N.

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Prasada, K.

Sanitary improvements through village health leagues. (Page 737).

Raja, K. C. K. E.

A plea for a forward public health policy in India. (Page 428).

Raman, T. K.

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Seshadrinathan, N., and Timothy, B.

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Ukil, A. C., Chatterjee, P., and De, K. N.

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D.—List of Centres and other places supplied with Anti-rabic vaccine by the different Pasteur Institutes in India during 1937.

PASTEUR INSTITUTE OF INDIA, KASAUJI.

Punjab.

Civil Centres.

Ajnala (District Amritsar).

*Ambala City.

*Amritsar.

Bhakkar (Distt. Mianwali).

Campbellpore (Distt. Attock).

Chakwal (Distt. Jhelum).

Chinuot (Distt. Jhang).

Dalhousie (Distt. Gurdaspur).

Dasuya (Distt. Hoshiarpur).

*Dera Ghazi Khan.

Dharamsala (Distt. Kangra).

*Ferozepore.

Gujarkhan (Distt. Rawalpindi).

*Gujranwala.

*Gujrat.

*Gurdaspur.

*Gurgaon.

Hafizabad (Distt. Gujranwala).

Hamirpur (Distt. Kangra).

*Hissar.

*Hoshiarpur.

Isakhel (Distt. Mianwali).

*Jhang.

*Jhelum.

*Jullundur.

*Karnal.

Khanewal (Distt. Multan).

Kulu (Distt. Kangra).

*Lahore.

Leiah (Distt. Muzaffargarh).

*Ludhiana.

*Lyallpore.

Mailsi (Distt. Multan).

*Mianwali.

Moga (Distt. Ferozepore).

*Montgomery.

*Multan.

Murree (Distt. Rawalpindi).

*Muzaffargarh.

Military Centres.

Ambala B. M. H.

Ambala I. M. H.

Campbellpore I. M. H.

Dalhousie B. M. H.

Jhelum I. M. H.

Jullundur B. M. H.

Lahore B. M. H.

Lahore I. M. H.

Mari Indus C. I. M. H.

Murree B. M. H.

Rawalpindi B. M. H.

Rawalpindi I. M. H.

Sialkot B. M. H.

Sialkot I. M. H.

Subathu B. M. H.

Civil Centres.

Nagar (Distt. Kangra).
Nankana Sahib (Distt. Sheikhupura).
Pakpattan (Distt. Montgomery).

Palampur (Distt. Kangra).
Panipat (Distt. Karnal).
Pattoki (Distt. Lahore).

Phillaur (Distt. Jullundur).
*Rawalpindi.
Rewari (Distt. Gurgaon).

*Rohtak.
Sangla (Distt. Sheikhupura).
Sargodha (Distt. Shahpur).

*Sheikhupura.
Sirsa (Distt. Hissar).
*Sialkot.

*Simla.
Sonipat (Distt. Rohtak).
Taufsa (Distt. D. G. Khan).
Una (Distt. Hoshiarpur).

United Provinces.

*Agra.
*Allahabad.
*Bareilly.

Agra B. M. H.
Allahabad B. M. H.
Bareilly B. M. H.

*Bonares.
*Cawnpore.
*Dehra Dun.

Bonares B. M. H.
Chakrata B. M. H.
Dehra Dun C. I. M. H.

*Fyzabad.
*Gorakhpur.
*Jhansi.

Fatehgarh I. M. H.
Fyzabad B. M. H.
Fyzabad I. M. H.

*Lucknow.
*Meerut.
Mussoorie (Distt. Dehra Dun).

Jhansi B. M. H.
Lansdowne I. M. H.
Landour B. M. H.

*Muttra.
*Naini Tal.

Lucknow B. M. H.
Meerut B. M. H.
Ranikhet B. M. H.
Roorkee I. M. H.

North-West Frontier Province.

Abbottabad (Distt. Hazara).
*Bannu.
*Dera Ismail Khan.

Abbottabad I. M. H.
Bannu C. I. M. H.
Fort Sandeman Military Hospital.
Kohat C. I. M. H.
Loralai I. M. H.
Mirali C. I. M. H.

Hangu (Distt. Kohat).
Haripur (Distt. Hazara).
*Kohat.

Nowshera B. M. H.
Peshawar B. M. H.
Razmak C. I. M. H.
Wana C. I. M. H.

Mansahra (Distt. Hazara).
*Mardan.
Nathigali (Distt. Hazara).

Civil Centres.

Noshera (Distt. Peshawar).
 Parachinar (Kurram Agency).
 *Peshawar.

Swabi (Distt. Mardan).
 Tank (Distt. D. I. Khan).

*Military Centres.**Rajputana.*

Ajmer.

Nasirabad B. M. H.
 Nasirabad I. M. H.

Delhi.

Delhi.
 New Delhi.

Delhi B. M. H.

Central Provinces.

Jubbulpore B. M. H.

Sind.

Karachi B. M. H.
 Karachi I. M. H.

Baluchistan.

Makran.

Quetta B. M. H.
 Quetta I. M. H.

Miscellaneous.

British Somaliland (Africa).

*Indian States.**Punjab.*

Bilaspur.
 Chamba.
 Faridkot.

Jind.
 Kapurthala.
 Malerkotla.

Mandi.
 Nabha.
 Patiala.

United Provinces.

Rampur.

N. W. F. Province.

Swat.

Rajputana.

Abu Road (Sirohi State).
 Alwar.
 Bharatpur.

Civil Centres.

Military Centres.

Rajputana —contd.

Bikaner.
Bundi.
Dholpur.

Jaipur.
Jhalawar.
Jodhpur.

Kotah.
Rajgarh.
Udaipur.

Central India.

Gwalior.

Kashmir.

Jammu.
Srinagar.

Bombay.

Bhuj.
Jamnagar.
Junagarh.

Bihar and Orissa.

Keonjharagarh.
Myurbhanj.
Patna.

*Railway Centres.**E. I. Railway (a).*

Allahabad.
Asansol.
Dhanbad.
Howrah.

Jamalpur.
Lilloah.
Moradabad.
Tundla.

B. N. W. Railway.

Gorakhpur.
Samastipur.

R. K. Railway.

Izatnagar.

(a) The E. I. Railway centres discontinued obtaining their supply from this Institute from 1st July 1937.

PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOR.*Madras Presidency.**Anantapur District—*

Government Headquarters Hospital, Anantapur.
 Government Hospital, Penukonda.
 Local Fund Dispensary, Kalyandrug.

Arcot North District —

Government Headquarters Hospital, Vellore.
 Government Hospital, Gudiyattam.
 Government Hospital, Tirupattur.
 Government Hospital, Tiruvannamalai.
 Local Fund Dispensary, Arkonam.

Arcot South District—

Government Headquarters Hospital, Cuddalore.
 Government Hospital, Chidambaram.
 Government Hospital, Kallakurichi.
 Government Hospital, Tindivanam.
 District Jail, Cuddalore.

Bellary District—

Government Headquarters Hospital, Bellary.
 Government Hospital, Adoni.
 Government Hospital, Hospet.
 Local Fund Dispensary, Siruguppa.
 Wellesley Sanatorium Jail, Bellary.

Chingleput District—

Government Headquarters Hospital, Chingleput.
 Government Hospital, Conjeevaram.
 Local Fund Dispensary, Chunampet.

Chittoor District—

Government Headquarters Hospital, Chittoor.
 Government Hospital, Madanapalle.
 Government Hospital, Tirupati.
 Local Fund Dispensary, Kuppan.

Coimbatore District—

Government Headquarters Hospital, Coimbatore.
 Government Hospital, Dharapuram.
 Government Hospital, Erode.
 Government Hospital, Gobichettipalayam.
 Government Hospital, Kollegal.
 Government Hospital, Pollachi.
 Government Hospital, Tirupur.
 Local Fund Hospital, Mettupalaiyam.
 Central Jail, Coimbatore.

Cuddapah District—

Government Headquarters Hospital, Cuddapah.
 Government Hospital, Proddatur.
 Government Hospital, Rajampet.
 Local Fund Dispensary, Pulivendla.
 Local Fund Dispensary, Rayachoti.

East Godavari District—

Government Headquarters Hospital, Cocanada.
 Government Hospital, Amalapuram.
 Local Fund Hospital, Bhadrachalam.
 Local Fund Hospital, Pithapuram.
 Local Fund Hospital, Polavaram.

West Godavari District—

Government Headquarters Hospital, Dillore.
 Government Hospital, Bhimavaram.
 Government Hospital, Narsapur.
 Government Hospital, Tanuku.
 Local Fund Dispensary, Chintalapudi.

Guntur District—

Government Headquarters Hospital, Guntur.
 Government Hospital, Narasaraopet.
 Government Hospital, Ongole.
 Government Hospital, Tenali.
 Local Fund Dispensary, Repalle.
 Local Fund Dispensary, Vinukonda.

Kanara South District—

Government Headquarters Hospital, Mangalore.
 Government Hospital, Coondapur.
 Government Hospital, Kasavagodi.
 Government Hospital, Puttur.
 Government Hospital, Udupi.
 Local Fund Hospital, Karkala.

Kistna District—

Government Headquarter Hospital, Masulipatam.
 Government Hospital, Bozwada.
 Government Hospital, Nandigama.
 Government Hospital, Nuzvid.
 Local Fund Dispensary, Gunnavaram.

Kurnool District—

Government Headquarters Hospital, Kurnool.
 Government Dispensary, Markapur.
 Local Fund Dispensary, Giddalur.
 Municipal Hospital, Nandyal.

Madras District—

Government General Hospital, Madras.

Madura District—

Government Headquarters Hospital, Madura.
 Government Hospital, Dindigul.
 Government Hospital, Kodaikanañ.
 Government Hospital, Palni.
 Government Hospital, Poriyakulam.
 Government Hospital, Usilampatti.
 Local Fund Dispensary, Nilakottai.
 Local Fund Dispensary, Tirumangalam.

Malabar District—

Government Headquarters Hospital, Calicut.
 Government Hospital, Cannanore.
 Government Hospital, Cochin.
 Government Hospital, Manantoddy.
 Government Hospital, Manjeri.
 Government Hospital, Palghat.
 Government Hospital, Ponani.
 Government Hospital, Tellicherry.
 Local Fund Hospital, Perintalamanna.
 Local Fund Dispensary, Badagara.
 Local Fund Dispensary, Ottapalam.
 Central Jail, Cannanore.

Nellore District—

Government Headquarters Hospital, Nellore.
 Government Hospital, Gudur.
 Government Hospital, Kanigiri.
 Government Hospital, Kavali.
 Government Hospital, Udayagiri.

Nilgiris District—

Lawrence Memorial Royal Military School, Lovedale.

Ramnad District—

Government Headquarters Hospital, Ramnad.
 Government Hospital, Rameswaram.
 Government Hospital, Sivaganga.
 Local Fund Dispensary, Aruppukottai.

Salem District—

Government Headquarters Hospital, Salem.
 Government Hospital, Krishnagiri.
 Government Hospital, Namakkal.
 Local Fund Hospital, Yercaud.
 Local Fund Dispensary, Rasipuram.
 Central Jail, Salem.

Tanjore District—

Government Headquarters Hospital, Tanjore.
 Government Hospital, Kumbakonam.
 Government Hospital, Mayavaram.
 Government Hospital, Negapatam.
 Local Fund Hospital, Nannilam.
 Local Fund Hospital, Pattukottai.

Tinnevely District—

Government Headquarters Hospital, Palamcottah.
 Government Hospital, Nanguneri.
 Government Hospital, Tenkasi.
 Government Hospital, Tuticorin.
 Local Fund Hospital, Ambasamudram.
 Local Fund Hospital, Kovilpatti.
 Local Fund Dispensary, Tiruchendur.

Trichinopoly District—

Government Headquarters Hospital, Trichinopoly.
 Government Hospital, Ariyalur.
 Government Hospital, Karur.
 Local Fund Dispensary, Jayankondasholapuram.
 Local Fund Dispensary, Musiri.

Vizagapatam District—

Government Headquarters Hospital, Vizagapatam.
 Government Hospital, Chicacole.
 Government Hospital, Narasāpatam.
 Government Hospital, Palkonda.
 Government Hospital, Parvatipuram.
 Local Fund Hospital, Bobbili.
 Local Fund Hospital, Chodavaram.

Military Centres.

British Military Hospital, Bangalore.
 British Military Hospital, Malappuram.
 British Military Hospital, Wellington.
 British Military Hospital, Cannanore.

Coorg—

The Sub-Assistant Surgeon, Fraserpet.
 The Sub-Assistant Surgeon, Gonikoppal.
 The Civil Surgeon, Mercara.
 The Sub-Assistant Surgeon, Mumad.
 The Sub-Assistant Surgeon, Napokdu.
 The Sub-Assistant Surgeon, Siddapur.
 The Sub-Assistant Surgeon, Shanivarsante.
 The Sub-Assistant Surgeon, Semwarpet.
 The Sub-Assistant Surgeon, Srimangala.
 The Sub-Assistant Surgeon, Suntikoppa.
 The Assistant Surgeon, Virarajendrapet.

French India—

The Director, Medical Service, Pondicherry.

*Railways.**South Indian Railway—*

The Railway Medical Officer, Erode.
 The Railway Medical Officer, Golden Rock.
 The Railway Medical Officer, Madurai.
 The Railway Medical Officer, Podanur.
 The Chief Medical Officer, Trichinopoly.

Madras and Southern Mahratta Railway—

The Railway Medical Officer, Bezwada.

The Railway Medical Officer, Guntakal.

The Railway Medical Officer, Perambur.

H. E. H. The Nizam's State Railway—

The Chief Medical Officer, Lallaguda.

*Indian States.**Banganapalle—*

The Chief Medical Officer, Banganapalle.

Cochin—

The Civil Surgeon, General Hospital, Ernakulam.

The Civil Surgeon, Civil Hospital, Trichur.

Hyderabad—

The District Civil Surgeon, Asafabad.

The District Civil Surgeon, Aurangabad.

The District Civil Surgeon, Bidar.

The District Civil Surgeon, Bir.

The District Civil Surgeon, Gulburga.

The District Civil Surgeon, Hanamkonda.

The Chemical Examiner and Bacteriologist, H. E. H. the Nizam's Government, Hyderabad-Deccan.

The District Civil Surgeon, Karimnagar.

The District Civil Surgeon, Mahbubnagar.

The District Civil Surgeon, Medak.

The District Civil Surgeon, Nalgonda.

The District Civil Surgeon, Nanded.

The District Civil Surgeon, Nizamabad.

The District Civil Surgeon, Osmanabad.

The District Civil Surgeon, Parbhani.

The District Civil Surgeon, Raichur.

The Medical Officer, King Edward VII Memorial Hospital, Secunderabad (Deccan).

The General Manager, Singareni Collieries, Ltd., Singareni Collieries.

Mysore—

The Health Officer, Civil and Military Station, Bangalore.

The Medical Officer, Victoria Hospital, Bangalore.

The Medical Officer, Mysore Iron Works Hospital, Bhadravati.

The Chief Medical and Sanitary Officer, Kolar Gold Fields, Champion Reef.

The District Medical Officer, Chikamagalur.

The District Medical Officer, Chitaldroog.

The District Medical Officer, Hassan.

The District Medical Officer, Kolar.

The Medical Officer, Krishnarajendra Hospital, Mysore.

The District Medical Officer, Robertsonpet.

The District Medical Officer, Shimoga.

The District Medical Officer, Tumkur.

Pudukkottah—

The Chief Medical Officer, Pudukkottah.

Sandur—

The Chief Medical Officer, Sandur.

Travancore—

The Public Health Laboratory, Trivandrum.

The Chief Medical Officer, Kannan Devan Hills Produce Co., Ltd., Munnar.

The Chief Medical Officer, Travancore Medical Fund, Peermade.

Mission Hospitals.

Star of Hope Hospital, Canadian Baptist Mission, Akidu (West Godavari District).

United Mission Tuberculosis Sanatorium, Arogyavaram (Chittoor District).

Church of England Zenana Mission Hospital, Bangalore (Mysore State).

Canadian Baptist Mission Hospital, Chicacole (Vizagapatam Distt.).

London Mission Hospital, Chikballapur (Mysore State).

Leper Home and Hospital, Dichpali (Hyderabad State).

London Mission Hospital, Erode (Coimbatore Distt.).

Wesleyan Mission Hospital, Ikkadu, *via* Tiruvallur (Chingleput Distt.).

London Mission Hospital, Jammalamadugu (Cuddapah District).

Church of Scotland Mission Hospital, Jalna (Hyderabad State).

Methodist Episcopal Mission Hospital, Kolar Town (Mysore State).

Mary Lott Lyle's Hospital, American Arcot Mission, Madanapalle (Chittoor District).

Wesleyan Mission Hospital, Medak (Hyderabad State).

Wesleyan Mission Hospital, Nagari (Chittoor District).

South Travancore Medical Mission Hospital, London Mission, Neyyoor (Travancore State).

American Baptist Mission Hospital, Ongole (Guntur District).

United Lutheran Mission Hospital, Rajahmundry (East Godavari District).

Canadian Mission Hospital, Sompetta (Ganjam District).

Danish Mission Hospital, Tirukkoyilur (South Arcot District).

National Missionary Society Mission Hospital, Tirupattur (North Arcot District).

Wesleyan Mission Hospital, Tiruvallur (Chingleput District).

Canarese Evangelical Mission Hospital, Udipi (South Kanara District).

Canadian Baptist Mission Hospital, Vuyyuru (Kistna District).

Scudder Memorial Hospital, Ranipet (North Arcot District).

PASTEUR INSTITUTE, PATNA.*Bihar.*

(Centres opened by State--Provincial Government).

Monghyr (District Monghyr).

Darbhanga (Laheriasaria) (District Darbhanga).

Battiah (District Champaran).

Ranchi (District Ranchi).

Bhagalpur (District Bhagalpur).

Dhanbad (District Manbhum).

HAFFKINE INSTITUTE, BOMBAY.

Haffkine Institute, Parel, Bombay.

Civil Hospital, Ahmedabad.

Civil Hospital, Ahmednagar.

Civil Hospital, Belgaum.

Civil Hospital, Jalgaon.

Civil Hospital, Karwar.

Civil Hospital, Nasik.

Civil Hospital, Poona.

Civil Hospital, Ratnagiri.

Civil Hospital, Sholapur.

Civil Hospital, Surat.

Civil Hospital, Satara.

Civil Hospital, Bijapur.

Civil Hospital, Dhulia.

Civil Hospital, Alibag.

Civil Hospital, Kaira.

Civil Hospital, Broach.

Civil Hospital, Dharwar.

Civil Hospital, Godhra.

Civil Hospital, Thana.

Local Bodies—

The Health Officer, Broach Municipality, Broach.

Indian States—

The Chief Medical Officer, Alirajpur, C. I.

The Chief Medical Officer, Baroda.

The Chief Medical Officer, Barwani, C. I.

The Chief Medical Officer, Bhavnagar, Kathiawar.

The Chief Medical Officer, Bhopal, C. I.

The Chief Medical Officer, Cambay, Gujarath.

The Chief Medical Officer, Chhota-Udepur, Gujarath.

The Chief Medical Officer, Dharampur, Gujarath.

The Chief Medical Officer, Dhoraji, Kathiawar.

The Chief Medical Officer, Dhrangadra Kathiawar.

Inspector General of Hospital, Indore, C. I.

King Edward Hospital, Indore, C. I.

Chief Medical Officer, Kolhapur, S. M. Country.

Chief Medical Officer, Morvi, Kathiawar.

Chief Medical Officer, Palanpur, Kathiawar.

Chief Medical Officer, Palitana, Kathiawar.

Chief Medical Officer, Porbunder, Kathiawar.

Chief Medical Officer, Rajkot, Kathiawar.

Chief Medical Officer, Rajpipla, Gujarath.

Chief Medical Officer, Jhalwar State, Brijnagar (Rajputana).

Other Provinces—

Civil Surgeon, Akola C.P.
 Civil Surgeon, Hoshangabad, C. P.
 Civil Surgeon, Jubbulpore, C. P.

Civil Surgeon, Nagpur, C. P.
 Civil Surgeon, Nowgong, Bundelkhand.
 Civil Surgeon, Quetta, Baluchistan.

Civil Surgeon, Raipur, C. P.
 Civil Surgeon, Saugor, C. P.
 Civil Surgeon, Hyderabad, Sind.

Civil Surgeon, Karachi, Sind.
 Director, Institute Bacteriologico, Nova Goa.
 Civil Surgeon, Wardha, C. P.

Medical Officer, Belapur Co., Ltd., Haringaon (Distt. Ahmednagar, Bombay).
 Health Officer, Daman (near Surat).
 Civil Surgeon, Khandwa, C. P.

Civil Surgeon, Chindwara, C. P.
 Civil Surgeon, Chanda, C. P.

Railway—

Medical Officer, B., B. & C. I. Rly., Ajmer.
 District Medical Officer, Bhusawal.
 District Medical Officer, Byculla.

District Medical Officer, Jhansi.
 District Medical Officer, M. & S. M. Railway, Hubli.
 District Medical Officer, Igatpuri.

District Medical Officer, Sholapur.
 Medical Officer, Lady Jackson Hospital, Frelandgang, Dohad.

Military—

Officer Commanding, R. A. F. Hospital, Aden.
 Officer Commanding, British Military Hospital, Ahmednagar.
 Officer Commanding, British Military Hospital, Belgaum.

Officer Commanding, British Military Hospital, Colaba City.
 Officer Commanding, British Military Hospital, Deolali.
 Officer Commanding, British Military Hospital, Jhansi.

Officer Commanding, British Military Hospital, Jubbulpore.
 Officer Commanding, British Military Hospital, Mhow.
 Officer Commanding, British Military Hospital, Nasirabad.

Officer Commanding, British Military Hospital, Pachmarhi.
 Officer Commanding, British Military Hospital, Poona.
 Officer Commanding, British Military Hospital, Trimulgherry.

Officer Commanding, Indian Military Hospital, Ahmedabad.
 Officer Commanding, Indian Military Hospital, Baroda.
 Officer Commanding, Indian Military Hospital, Bombay.

Officer Commanding, Indian Military Hospital, Santa Cruz.
 Officer Commanding, Indian Military Hospital, Saugor.

PASTEUR INSTITUTE, SHILLONG (ASSAM.)

Public Centres—

Gauhati (Distt. Kamrup).
 Dibrugarh (Distt. Lakhimpur).
 Silchar (Distt. Cachar).

Jorhat (Distt. Sibsagar).
 Tezpur (Distt. Darrang).
 Sylhet (Distt. Sylhet).

Dhubri (Distt. Goalpara).
 Habiganj (Distt. Sylhet).
 Karimganj (Distt. Sylhet).

Maulvi Bazar (Distt. Sylhet).
 Imphal (Distt. Manipur).
 Nowgong (Distt. Nowgong).

Kohima (Distt. Naga Hills).
 Sunamganj (Distt. Sylhet).
 Tura (Distt. Garo Hills).

Goalpara (Distt. Goalpara).
 Sibsagar (Distt. Sibsagar).
 Hailakandi (Distt. Cachar).

Golaghat (Distt. Sibsagar).
 Mangaldai (Distt. Darrang).
 North Lakhimpur (Distt. Lakhimpur).
 Jowai (Distt. K. & J. Hills).

Private Centres.

Name of Place.	Name of Officers.
Balijan Tea Estate (Distt. Lakhimpur)	Medical Officer, Balijan Tea Estate, Chabua P. O.
Badlipar Tea Estate (Distt. Sibsagar)	Medical Officer, Badlipar Tea Company, P. O. Badlipur.
Masimpur (Distt. Cachar)	Medical Officer, Burma Oil Company.
Digboi (Distt. Lakhimpur)	Chief Medical Officer, Assam Oil Company.
Margherita (Distt. Lakhimpur)	Medical Officer, Assam Rly. & Trading Company.
Lahowal (Distt. Lakhimpur)	Medical Officer, Jokai Tea Company.
Dijoo Estate (Distt. Lakhimpur)	Medical Officer, Dijoo Tea Estate, Sapoti.
Sapoi Tea Estate (Distt. Darrang)	Medical Officer, Sapoi Tea Estate, Dhakiajuli
Cinnamara (Distt. Sibsagar)	Medical Officer, Jorhat Tea Company, Cinnamara.
Naharjan Tea Estate (Distt. Sibsagar)	Medical Officer, Naharjan Tea Estate, Bokakhat P. O.
Panerihat (Distt. Darrang)	Medical Officer, Mangaldai, Medical Association, Panerihat.
Halem Tea Estate (Distt. Darrang)	Medical Officer, Halem Tea Estate, Halem.
Mariani (Distt. Sibsagar)	Medical Officer, Mariani Medical Association Mariani.
Nazira (Distt. Sibsagar)	Medical Officer, Assam Company, Ltd., Nazira.
Labac (Distt. Cachar)	Medical Officer, Labac Central Hospital, Dewan.

Name of place.	Name of Officers.
Honkonguri (Distt. Lakhimpur)	. Medical Officer, Assam Frontier Tea Company, Barahapjan.
Maijan Tea Estate (Distt. Lakhimpur)	. Medical Officer, Maijan Tea Estate, Dihrugarh.
Suffry Tea Estate (Distt. Sibsagar)	. Medical Officer, Singlo Tea Company, Suffry.
Doom Dooma Tea Estate (Distt. Lakhimpur)	. Medical Officer, Doom Dooma Tea Company, Doom Dooma.
Namburnadi Tea Company (Distt. Lakhimpur)	. Medical Officer, Namburnadi Tea Estate, Barpathar.
Seleng Tea Estate (Distt. Sibsagar)	. Medical Officer, Jhanzie Tea Association.
Pertabghur Tea Estate (Distt. Darrang)	. Medical Officer, Bishnath Medical Association, Sootea.
Sepon Tea Estate (Distt. Lakhimpur)	. Medical Officer, Sepon Tea Estate, Moran.
Sonabheel Tea Estate (Distt. Darrang)	. Medical Officer, Sonabheel (Assam) Tea Company, Ltd., Bindukuri.
Kalain Tea Estate (Distt. Cachar)	. Medical Officer, Kalain Tea Estate, Kalain.
Barjuli Tea Estate (Distt. Darrang)	. Chief Medical Officer, Empire of India and Ceylon Tea Company, Barjuli.
Naharani Tea Estate (Distt. Sibsagar)	. Medical Officer, Naharani Tea Estate.
Jeypur Tea Estate (Distt. Lakhimpur)	. Medical Officer, Jeypur Tea Estate, Jeypur.
Makum Tea Estate (Distt. Lakhimpur)	. Medical Officer, Makum (Assam) Tea Company, Ltd., Margherita.
Halmirah Tea Estate (Distt. Sibsagar)	. Medical Officer, Golaghat Medical Association, Golaghat.
Sapoti Tea Estate (Distt. Lakhimpur)	. Medical Officer, Jokai Tea Company. P. O. North Lakhimpur.
Assam Bengal Railway Centre (Distt. Lumding, Nongong)	. Chief Medical Officer, Assam Bengal Railway.
Dhamai Tea Estate (Distt. Sylhet)	. Chief Medical Officer, Juri Valley Medical Association, Juri.
Moheema (Distt. Sibsagar)	. Medical Officer, Moabund Medical Association, Moheema.
Hoogrijan Tea Estate (Distt. Lakhimpur)	. Medical Officer, Hoogrijan Tea Estate, Hoogrijan.
Borhat Tea Estate (Distt. Lakhimpur)	. Medical Officer, Borhat Tea Estate, Borhat.
Amguri Tea Estate (Distt. Sibsagar)	. Medical Officer, Amguri Tea Estate, Amguri.
Sonari (Distt. Sibsagar)	. Medical Officer, Sonari Medical Practice, Sonari.
Doomni Tea Estate (Distt. Kamrup)	. Medical Officer, Doomni Tea Estate, Kamrup.
Luskerpur (Distt. Sylhet)	. Chief Medical Officer, Luskerpur Valley Medical Association, Chandpurbagan P. O.

PASTEUR INSTITUTE, CALCUTTA.

Bankura District—

Sadar Hospital, Bankura.

Vishnupur Sub-Divisional Hospital.

Sonamukhi Charitable Dispensary.

Barisal District—

Sadar Hospital, Barisal.
 Bakargange Charitable Dispensary.
 Patuakhali Municipal Dispensary.
 Perojpur Sub-Divisional Dispensary.
 Police Hospital, Barisal.
 Bhola Sub-Divisional Hospital.

Birbhum District—

Sadar Hospital, Suri.
 Rampurhat Sub-Divisional Dispensary.

Bogra District—

Sadar Hospital, Bogra.
 Sherpur Municipal Hospital.

Burdwan District—

L. M. Hospital, Asansol.
 Ausgram Charitable Dispensary.
 Bhatar Charitable Dispensary.

Fraser Hospital, Burdwan.
 Katwa Sub-Divisional Dispensary.
 Ketugram Dispensary.

Kalna Sub-Divisional Dispensary.
 Palla Charitable Dispensary, Barsul.
 Purbasthali Dispensary.

Ranigang Hospital.
 Moral Charitable Dispensary, Burdwan.
 D. B. Dispensary, Kaleswar.

Mangalkota Charitable Dispensary.
 Satgachia Charitable Dispensary.
 Kanksa Charitable Dispensary.

Molandighi Charitable Dispensary.
 Mohata Charitable Dispensary, Ghuskara.

Calcutta District—

Sambhunath Pandit Hospital, Bhowanipur.
 Presidency General Hospital.
 Mayo Hospital.
 Lady Duffarin Victoria Hospital.
 Campbell Hospital.

Chittagong District—

Cox's Bazar Sub-Divisional Dispensary.
 General Hospital, Chittagong.
 Sadar Hospital, Rangamatti.

Dacca District—

Manikganj Sub-Divisional Dispensary.
 Mitford Hospital, Dacca.
 Victoria Hospital, Narayangunj.
 Munshigonj Sub-Divisional Hospital.

Darjeeling District—

Charteris Hospital, Kalimpong.

Kursoong Hospital.

Siliguri Sub-Divisional Dispensary.

Victoria Hospital, Darjeeling.

Dinajpur District—

Sardar Hospital, Dinajpur.

Balurghat Sub-Divisional Dispensary.

Dinajpur Municipal Hospital.

Patnitola Charitable Dispensary.

Thakurgaon Charitable Dispensary.

Raiganj Charitable Dispensary.

Faridpur District—

Sadar Hospital, Faridpur.

Goalundo Charitable Dispensary.

Gopalganj Sub-Divisional Dispensary.

Rajbari Sub-Divisional Dispensary.

Madaripur Sub-Divisional Dispensary.

Naria Charitable Dispensary.

Shibchar Charitable Dispensary.

Howrah District—

Bally Beams Charitable Dispensary.

Banra Charitable Dispensary.

Batore Charitable Dispensary.

Howrah General Hospital.

Salkia Charitable Dispensary.

Uluberia Charitable Dispensary.

Khuruli Charitable Dispensary.

Hooghly District—

Imambarah Hospital, Chinsurah.

Uttarpara Hospital.

Walsh Hospital, Serampore.

Arambagh Municipal Hospital.

Jalpaiguri District—

Sadar Hospital, Jalpaiguri.

Jessore District—

Sadar Hospital, Jessore.

Bongaon Sub-Divisional Dispensary.

Kotochandpur Municipal Dispensary.

Mhonidah Sub-Divisional Dispensary.

Magura Sub-Divisional Dispensary.

Narail Sub-Divisional Dispensary.

Police Hospital, Jessore.

Khulna District—

Bagerhat Sub-Divisional Hospital.
 Satkhira Sub-Divisional Hospital.
 Woodburn Hospital, Khulna.

Malda District—

Sadar Hospital, English-bazar, Malda.

Midnapore District—

Sadar Hospital, Midnapore.
 Contai Sub-Divisional Dispensary.
 Ghatal Sub-Divisional Dispensary.
 Jhargram Sub-Divisional Dispensary.
 Tamluk Sub-Divisional Dispensary.

Murshidabad District—

Sadar Hospital, Berhampore.

Mymensingh District—

D. N. Charitable Dispensary, Tangail.
 Jamalpur Municipal Dispensary.
 Kishoregunj Municipal Hospital.

Muktagacha Municipal Hospital.
 Netrokona Sub-Divisional Dispensary.
 S. K. Hospital, Mymensingh.

Sherpur Harachandra Charitable Hospital.
 Tangail Charitable Dispensary.

Nadia District—

Chuadanga Sub-Divisional Dispensary.
 Sadar Hospital, Krishnagar.
 Kumarkhali Municipal Dispensary.

Kushtia Sub-Divisional Dispensary.
 Meherpur Sub-Divisional Dispensary.
 Nabadwip Garret Hospital.

Ranaghat Sub-Divisional Dispensary.
 Santipur Municipal Charitable Dispensary.
 Police Hospital, Krishnagar.

Noakhali District—

Banchanagore Charitable Dispensary.
 Begumgunj Charitable Dispensary.
 Boseshat Charitable Dispensary.

Chagalnaya Charitable Dispensary.
 Duttapara Charitable Dispensary.
 Danganbhuya Charitable Dispensary.

Feni Sub-Divisional Dispensary.
 Hajipur Charitable Dispensary.
 Hatiya Charitable Dispensary.

Joyag Charitable Dispensary.
 Lukhipur Charitable Dispensary.
 Mutiaganj Charitable Dispensary.

Ramgunj Charitable Dispensary.

Naokhali District—contd.

Raipur Charitable Dispensary.
 Ramgati Charitable Dispensary.
 Sonbagh Charitable Dispensary.
 Sadar Hospital, Naokhali.
 Sonamulchi Charitable Dispensary.
 Sujatpur Charitable Dispensary.
 Fulgazi Charitable Dispensary.

Pabna District—

Sadar Hospital, Pabna.
 Serajganj Victoria Charitable Hospital.

Rangpur District—

Sadar Hospital, Rangpur.
 Gaibandha Sub-Divisional Dispensary.
 Kurigram Sub-Divisional Dispensary.

Rajshahi District—

Sadar Hospital, Rajshahi. "
 Naogaon Sub-Divisional Dispensary.
 Natore Sub-Divisional Dispensary.

Tippera District—

Elgin Hospital, Chandpur.
 Brahmanbaria Sub-Divisional Dispensary.
 Sadar Hospital, Comilla.

24-Parganas District—

Dr. B. N. Bose's Hospital, Barrackpore.
 Baranagar Charitable Dispensary.
 Baruipur V. M. Charitable Dispensary.

Behala Municipal Charitable Dispensary.
 Budgo-Budgo Municipal Hospital.
 Basirhat Sub-Divisional Dispensary.

Diamondharbour Sub-Divisional Dispensary.
 Dum-Dum Charitable Dispensary.
 Harinavi Charitable Dispensary.

Manirampur Charitable Dispensary.
 Naihati Municipal Dispensary.
 Nawabgunj Charitable Dispensary.

Prince Golan Md. Charitable Dispensary (Tollygunge).
 Sagar Dutta Hospital (Kamarhatti).
 Panihati Municipal Hospital.

Barasat Municipal Hospital.
 Baduria Municipal Hospital.

Military—

British Military Hospital, Dinapore.
 British Military Hospital, Barrackpore.
 British Military Hospital, Calcutta.
 British Military Hospital, Lebong.

Indian Military Hospital, Alipore.
 Post Hospital, Dacca.

Military—contd.

Post Hospital, Bankura.

Post Hospital, Comilla.

Military Hospital, Chittagong.

British Military Hospital, Muzaffarpur.

States—

Chief Medical Officer, Cooch-Bihar.

Chief Medical Officer, Tripura State.

Chief Medical Officer, Bonai State.

Chief Medical Officer, Gangpur State.

Chief Medical Officer, Bamra State.

Chandernagar Hospital.

Railways—

Medical Officer, E. B. Railway, Sealdah.

Dy. Controller of Stores, B. N. R., Kharagpur.

Medical Officer, B. N. R., Garden Reach.

District Medical Officer, E. I. Railway, Tundla.

District Medical Officer, E. I. Railway, Jamalpur.

District Medical Officer, E. I. Railway, Lucknow.

District Medical Officer, E. I. Railway, Dinapore.

District Medical Officer, E. I. Railway, Allahabad.

District Medical Officer, E. I. Railway, Moradabad.

District Medical Officer, E. I. Railway, Lilloah.

District Medical Officer, E. I. Railway, Asansol.

District Medical Officer, E. I. Railway, Howrah.

Tea Estates—

The Medical Officer-in-Charge of Tea Estates are supplied with vaccine for the treatment of their patients.

Appendix VIII
relating to
Section IX.

A.—TABLE SHOWING SICKNESS

Statistics by

Provinces.†	Average daily strength.	Con- stantly sick.	Influenza.				Cholera.			
			Actuals.		Ratios.		Actuals.		Ratios.	
			A.	D.	A.	D.	A.	D.	A.	D.
India (excluding Andamans *)	116,830	22	3,659	35	31	0·3	11	3	0·1	0·03
	122,782	23	5,280	31	43	0·3	9	2	0·1	0·02
	125,382	24	4,706	23	38	0·2	18	4	0·1	0·03
N.-W. F. P.	6,179	23	50	...	8	...	...	...	...	...
	6,355	24	136	...	21	...	...	...	...	...
	6,850	30	160	...	15	0·03	...	...	...	...
Punjab	18,415	23	147	2	8	0·1	...	...	...	...
	19,266	22	155	1	8	0·1	...	...	...	...
	20,120	22	161	2	8	0·1	1	...	0·06	0·02
U. P.	29,782	18	739	13	25	0·4	7	2	0·2	0·07
	31,049	21	1,452	15	47	0·5	7	1	0·2	...
	32,936	21	1,120	6	34	0·2	10	2	0·3	0·05
Bihar	9,284	24	245	...	26	...	1	...	0·1	...
	10,071	24	702	4	70	0·4	1	1	0·1	0·1
	10,226	25	349	3	34	0·3	3	1	0·3	0·1
Orissa	1,096	25	9	1	8	0·9	...	...	...	...
	930	23	21	...	23	...	...	...	...	...
	965	22	37	1	39	1·0	...	...	...	...
Bengal	19,387	37	1,968	8	102	0·4	1	...	0·05	...
	20,437	38	2,078	7	102	0·4	...	...	...	...
	18,589	38	2,026	6	109	0·3	3	1	0·2	0·03
C. P.	4,384	9	151	11	34	2·5	...	...	...	...
	4,665	9	21	...	3	...	...	...	...	...
	4,542	10	113	...	26	0·1	...	...	0·1	0·04
Bombay	7,250	17	52	...	7	...	2	1	0·3	0·1
	7,736	17	110	1	14	0·1	1	...	0·1	...
	9,080	20	106	...	12	0·04	...	...	0·02	...
Sind	3,803	24	1	...	0·3	...	...	...	...	...
	3,543	22	...	...	...	...	...	...	...	...
	3,908	22	8	...	2	...	...	...	...	...
Madras	11,710	15	192	...	16	...	...	...	...	...
	12,728	18	420	3	33	0·2	...	...	...	...
	12,177	17	521	2	43	0·2	...	...	...	...
Assam	3,566	22	79	...	22	...	...	...	...	...
	4,019	23	179	...	45	...	...	...	...	...
	3,931	24	131	2	33	0·4	...	...	...	...

*The sickness and mortality figures relating to Andamans have been dealt with in paragraph 1 of this report.

†Excluding subsidiary jails.

A.—Admissions. D.—Deaths.

AND MORTALITY.

Administrations.

Smallpox.				Enteric fever.				Malaria.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
33	2	0.3	0.02	236	30	2	0.3	14,205	44	122	0.4
04	6	0.5	0.05	250	33	2	0.3	18,400	55	150	0.4
57	3	0.5	0.02	279	34	2	0.3	21,511	67	172	0.5
2	...	0.3	...	32	8	5	1.3	787	2	127	0.3
...	...	...	...	38	2	6	0.3	1,012	4	159	0.6
1	...	0.1	...	33	2	5	0.4	1,337	4	202	0.6
6	...	0.3	...	66	4	4	0.2	2,383	7	129	0.4
6	1	0.3	0.1	46	7	2	0.4	3,652	8	190	0.4
5	...	0.2	0.01	61	8	3	0.4	5,013	14	249	0.7
9	1	0.3	0.03	33	3	1	0.1	3,723	5	125	0.2
13	1	0.4	...	30	...	1	...	5,834	6	188	0.2
25	1	0.8	0.02	42	4	1	0.1	4,846	9	147	0.3
...	...	...	...	29	3	3	0.3	500	3	54	0.3
4	...	0.4	...	22	6	2	0.6	583	1	58	0.1
5	...	0.5	0.04	32	4	3	0.4	729	5	71	0.5
...	...	...	...	...	...	...	...	33	...	30	...
1	...	1.2	...	1	...	1	0.4	87	...	94	...
...	...	...	...	...	...	...	...	87	...	91	0.2
10	1	0.6	0.05	21	6	1	0.3	3,835	17	198	0.9
36	3	1.8	0.1	24	3	1	0.1	4,244	20	208	1.0
14	1	0.7	0.05	28	5	2	0.3	4,926	20	265	1.1
...	...	...	...	1	1	0.2	0.2	230	1	52	0.2
...	...	...	...	5	1	1	0.2	196	3	42	0.6
2	...	0.4	...	4	...	1	0.04	203	3	46	0.6
...	...	...	...	22	1	3	0.1	841	3	116	0.4
...	...	...	...	20	4	3	0.5	834	3	108	0.4
1	...	0.1	...	21	3	2	0.3	1,721	2	190	0.2
2	...	0.5	...	22	3	6	0.5	1,110	...	292	...
1	1	0.3	0.3	26	2	7	0.6	921	2	232	0.6
1	...	0.4	0.05	16	2	4	0.6	1,765	2	324	0.6
2	...	0.3	...	3	...	0.3	...	213	4	18	0.3
1	...	0.1	...	29	6	2	0.5	307	2	24	0.2
1	...	0.1	0.02	23	2	2	0.2	230	2	19	0.1
3	...	0.6	...	1	1	0.3	0.3	271	...	76	...
2	...	0.5	...	8	1	2	0.2	318	2	79	0.5
...	...	0.1	...	8	1	2	0.4	493	3	125	0.8

NOTE.—The three figures against each administrative group are those for (1) 1937, (2) 1936 and (3) 1932-36. The rates have been calculated *per mille* of the average strength.

A.—TABLE SHOWING SICKNESS

Statistics by

Provinces.†	Average daily strength.	Constantly sick.	Pyrexia of uncertain origin.				Tubercle of the lungs.			
			Actuals.		Ratios.		Actuals.		Ratios.	
			A.	D.	A.	D.	A.	D.	A.	D.
India (excluding Andamans*) .	116,830	22	922	4	8	0.03	588	208	5	1.8
	122,782	23	757	1	6	0.04	798	241	6	2.0
	125,383	24	1,130	5	9	0.04	749	235	6	1.9
N.-W. F. P.	6,179	23	40	...	6	...	57	21	9	3.4
	6,365	24	23	...	4	...	51	19	8	3.0
	6,850	30	24	...	3	0.03	54	19	8	2.7
Punjab	18,415	23	220	...	12	...	77	18	4	1.0
	19,266	22	314	4	16	0.2	205	53	1	2.8
	20,120	22	310	2	16	0.1	172	54	9	2.7
U. P.	29,782	18	155	1	5	0.03	107	39	4	1.3
	31,049	21	140	...	5	...	97	28	3	0.9
	32,936	21	353	1	11	0.04	137	37	4	1.1
Bihar	9,284	24	5	...	1	...	70	37	8	4.0
	10,071	24	4	...	...	...	66	35	7	3.5
	10,226	25	11	...	1	0.02	76	36	7	3.5
Orissa	1,096	25	...	...	...	...	12	3	11	2.7
	930	23	1	...	1	...	5	2	5	2.2
	966	22	3	...	3	...	4	2	4	1.9
Bengal	19,387	37	392	...	15	...	100	29	5	1.5
	20,437	38	193	...	9	...	125	46	6	2.3
	18,539	38	311	...	17	0.02	107	31	6	1.7
C. P.	4,384	9	34	2	8	0.5	19	6	4	1.4
	4,605	9	26	1	6	0.2	21	7	5	1.5
	4,642	10	69	1	16	0.2	27	7	6	1.5
Bombay	7,250	17	7	...	1	...	25	12	3	1.7
	7,736	17	10	...	3	...	31	16	4	2.1
	9,080	20	8	...	1	...	31	13	3	1.4
Sind	3,808	24	4	...	1	...	19	8	5	2.1
	3,543	22	...	...	...	...	16	6	5	1.7
	3,908	22	3	...	1	...	13	6	3	1.3
Madras	11,710	15	27	1	2	0.1	64	23	5	2.0
	12,728	18	23	...	2	...	115	12	9	0.9
	12,177	17	18	...	1	...	76	18	6	1.5
Assam	3,566	23	6	...	2	...	32	10	9	2.8
	4,019	23	11	...	3	...	5	14	14	8.5
	3,931	24	9	...	2	0.1	40	11	10	2.3

*The sickness and mortality figures relating to Andamans have been dealt with in paragraph 106 of this report.

†Excluding subsidiary jails.

A.—Admission; D.—Deaths.

AND MORTALITY—*contd.**Administrations.*

Pneumonia.				Other respiratory diseases.				Dysentery.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1,127	236	10	2.0	3,764	42	32	0.4	3,533	92	30	0.8
1,336	271	11	2.2	3,446	47	28	0.4	4,250	104	35	0.8
1,477	312	12	2.6	4,047	53	32	0.4	4,863	94	39	0.7
101	16	16	2.6	235	2	38	0.3	27	4	4	0.6
92	14	15	2.2	235	...	37	...	16	1	3	0.2
182	31	27	4.6	406	2	59	0.3	77	1	11	0.2
141	27	8	1.5	762	4	41	0.2	70	...	4	...
160	38	8	2.0	729	3	38	0.2	141	2	7	0.1
216	54	11	2.7	838	6	42	0.3	511	10	25	0.5
252	61	8	2.0	896	11	30	0.4	447	4	15	0.1
320	74	10	2.4	753	15	24	0.5	401	8	13	0.3
317	71	10	2.2	848	13	26	0.4	509	10	15	0.3
84	20	9	2.1	265	2	29	0.2	435	17	47	1.8
85	20	8	2.0	275	3	27	0.3	676	10	67	1.9
142	29	14	2.8	360	6	35	0.6	767	15	75	1.4
4	2	4	1.8	17	...	15	...	41	1	37	0.9
10	1	11	1.1	22	...	24	...	41	...	44	...
11	3	12	2.7	10	...	20	0.2	36	1	38	1.4
240	43	12	2.2	728	9	36	0.5	1,176	33	61	1.7
253	51	12	2.5	760	9	37	0.4	1,498	37	73	1.8
229	48	12	2.6	723	10	39	0.5	1,226	24	66	1.3
33	9	8	2.1	41	1	9	0.2	102	7	23	1.6
54	13	12	2.8	41	0	9	1.3	148	10	82	2.1
33	10	8	2.2	60	4	13	0.9	151	6	33	1.1
36	11	5	1.5	119	3	16	0.4	254	3	35	0.4
45	4	0	0.5	151	3	20	0.4	137	3	18	0.4
59	8	6	0.9	211	2	23	0.3	334	2	37	0.3
89	16	23	4.2	181	1	47	0.3	268	1	70	0.3
126	18	36	5.1	139	1	39	0.3	291	4	82	1.1
124	23	32	5.9	189	2	48	0.5	278	3	71	0.3
66	18	6	1.5	183	4	15	0.2	264	7	23	0.6
33	17	7	1.3	141	5	11	0.4	433	13	34	1.0
60	13	6	1.1	128	6	10	0.5	481	12	40	1.0
57	10	16	2.8	172	3	48	0.8	351	14	98	3.9
97	10	17	2.5	155	1	39	0.2	301	7	80	1.7
68	16	17	4.1	189	1	48	0.4	415	10	106	2.6

NOTE.—The three figures against each administrative group are those for (1) 1937, (2) 1936 and (3) 1932-36. The rates have been calculated *per mille* of the average strength.

A.—TABLE SHOWING SICKNESS

Statistics by

Provinces.†	Average daily strength.	Constantly sick.	Diarrhoea.			
			Actuals.		Ratios.	
			A.	D.	A.	D.
India (excluding Andamans*)	{ 116,830 122,782 125,382	22 23 24	1,950 2,179 2,843	21 24 24	17 18 23	0.2 0.2 0.2
N.-W. F. P.	{ 6,179 6,355 6,360	23 24 30	18 23 42	1 2 1	3 4 6	0.2 0.3 0.1
Punjab	{ 18,415 19,266 20,120	23 22 22	170 223 313	3 4 8	9 12 16	0.2 0.2 0.4
U. P.	{ 29,782 31,049 32,936	18 21 21	354 283 436	5 8 6	12 9 13	0.2 0.3 0.2
Bihar	{ 9,284 10,071 10,226	24 24 25	121 127 303	... 1 1	13 13 30	... 0.1 0.1
Orissa	{ 1,096 930 965	25 23 22	30 46 33		27 48 35	
Bengal	{ 19,387 20,437 18,689	37 38 38	858 1,056 1,130	3 2 2	44 52 61	0.1 0.1 0.1
C. P.	{ 4,384 4,605 4,642	9 9 10	34 80 89	2 2 2	8 17 20	0.5 0.4 0.4
Bombay	{ 7,250 7,736 8,080	17 17 20	165 180 266	2 1 ...	23 21 29	0.3 0.1 0.04
Sind	{ 3,803 3,543 3,908	24 22 22	134 106 104	2 1 1	35 30 27	0.5 0.3 0.4
Madras	{ 11,710 12,723 12,177	15 18 17	28 30 26	2 1 2	2 2 2	0.2 0.1 0.1
Assam	{ 3,566 4,019 3,931	22 23 24	8 11 62	 3	2 3 16	 0.2

*The sickness and mortality figures relating to Andamans have been dealt with in paragraph 106 of this report.

† Excluding subsidiary jails.

A.—Admissions. D.—Deaths.

AND MORTALITY—concl'd.

Administrations.

Anæmia and Debility.				All Causes.			
Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.
922	32	8	0.3	57,570	1,226	493	10
977	31	8	0.3	60,277	1,308	540	11
1,069	37	9	0.3	74,354	1,424	693	11
19	...	3	...	2,468	78	399	13
22	...	4	...	3,329	55	524	9
43	...	6	0.03	3,598	81	569	12
116	4	6	0.2	8,693	172	472	9
137	3	7	0.2	11,000	199	574	10
163	4	8	0.2	13,923	256	692	13
182	3	6	0.1	13,489	228	453	8
172	3	6	0.1	15,967	255	514	8
190	5	6	0.2	16,317	262	495	8
13	1	1	0.1	3,145	117	339	13
17	2	2	0.2	3,698	155	367	15
20	1	2	0.1	4,549	165	445	16
13	...	20	...	343	9	313	8
6	1	7	1.1	478	9	514	10
6	1	6	0.6	425	14	441	15
310	5	16	0.2	17,039	226	879	12
353	4	17	0.2	19,140	203	937	13
348	9	19	0.5	19,462	232	1,047	13
27	4	6	0.9	990	75	226	17
24	1	5	0.2	1,080	87	232	19
23	2	5	0.5	1,244	56	274	12
75	4	10	0.6	2,851	72	393	10
69	1	9	0.1	3,021	76	391	10
53	3	9	0.3	5,127	69	565	8
40	...	12	...	2,851	56	750	15
7	1	2	0.3	2,348	48	663	14
22	1	6	0.3	2,714	68	694	17
60	5	6	0.4	2,414	118	206	10
14	8	9	0.6	3,212	132	252	10
31	4	7	0.4	3,135	126	262	10
34	4	10	1.1	1,411	55	396	15
37	6	9	1.5	1,686	57	420	14
63	6	16	1.6	2,046	67	520	17

NOTE.—The three figures against each administrative group are those for (1) 1937, (2) 1936 and (3) 1932-36. The rates have been calculated *per mille* of the average strength.

AUG 15 1938

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675

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FOR 1937**

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*With the compliments of Lieutenant
Colonel E. Cotter, I.M.S., Public Health
Commissioner with the Government of
India.*

New Delhi, India.

10
1939

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 Imperial Publishing Coy., Lahore.
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 Indian Army Book Depot, Daryaganj, Delhi.
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ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937.

VOLUME II.

TABLE OF CONTENTS.

SECTION I.

ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

PARA.	PAGES-
1. General	1
2. Officers	2
3. Soldiers	2
<i>Principal Diseases affecting the British Army.</i>	
4. General	4
5. Malaria	7
6. Enteric group of fevers	11
7. Fevers of the typhus group	14
8. Dysentery, diarrhoea, colitis and amoebic hepatitis	16
9. Venereal Diseases	20
10. Effects of heat	22
11. Dengue and sandfly fever	23
12. Oriental sore	24
13. Cysticercosis	24
14. Diphtheria	24
15. Cerebrospinal fever	25
16. Smallpox	25
17. Respiratory diseases	26
18. Tuberculosis	26
19. Digestive diseases	26
20. Areolar tissue and local injuries	26
21. Mental diseases	27
22. Women and children (British other ranks)	27
23. Hygiene	28
Military Food Laboratory, Kasauli	28
Quarters and barracks	29
Water supplies	29
Swimming baths	30
Conservancy	30
Joint Sanitary Boards	30
Rat campaign	31
Ice factories	31
Mineral water factories	31
Dairies	31
Hygiene inspections	31
Field hygiene and sanitation	31

PARA.	PAGES.
24. Pathology	32
Enteric group of fevers and Salmonella infections	32
Dysentery	35
Diphtheria	37
Cerebrospinal fever	41
Routine examination of menials prior to employment	41
Laboratory tests in connection with the diagnosis of syphilis	42
Notes on routine laboratory work	44
25. Waziristan operations 1937	47
Appendix I. Radiology	53
Appendix II. Surgical operations	54

ON THE HEALTH OF THE INDIAN ARMY.

26. General	63
27. Officers	63
28. Soldiers	64

Principal diseases affecting the Indian Army.

29. Cerebrospinal meningitis	67
30. Dengue	70
31. Typhus fever	70
32. Sandfly fever	70
33. Dysentery, diarrhoea and colitis	70
34. Enteric group of fevers	71
35. Malaria	72
36. Pneumonia	73
37. Pyrexia of uncertain origin	74
38. Smallpox	74
39. Tuberculosis	74
40. Venereal diseases	74
41. Other diseases due to infection or infestation	74
42. Diseases of the circulatory system	75
43. Diseases of the respiratory system	75
44. Diseases of the digestive system	75
45. Minor septic diseases	76
46. Local injuries	76
47. Followers	76
48. Hygiene	78
49. Recruiting	79
50. Military operations in Khaisora valley (Waziristan)	80
51. Anti-rabic treatment	80
52. Welfare work among Indian troops families	81

APPENDICES.

SECTION I.—BRITISH ARMY.

TABLE.	PAGES.
A.—Stations by commands and independent districts	88
<i>Average strength, admissions into hospital, deaths, numbers invalided and constantly sick.</i>	
Warrant Officers, N. C. Os. and Men—	
I.—India	89
II.—Northern Command	92
III.—Western Command	95
IV.—Eastern Command	98
V.—Southern Command	101
VI.—British Other Ranks—Admission ratios (by months) for certain diseases	105
VII.—British Other Ranks—Admission ratios for certain diseases by stations and districts	106
VIII.—British Officers (British Service)	112
IX.—Wives of Warrant Officers, N. C. Os. and Men	114
X.—Children of Warrant Officers, N. C. Os. and Men	116
XI.—British Other Ranks—Admissions and death rates for certain diseases by Commands	118
XII.—Vaccination performed in the British and Indian Armies during 1937—Officers and Other Ranks	120
XIII.—Vaccination performed in the Families—British Army during 1937	121
XIV.—Vaccination performed in the Families—Indian Army during 1937	121

SECTION II.—INDIAN ARMY.

B.—Stations by commands and independent districts	124
<i>Average strength, admissions into hospital, deaths, numbers invalided and constantly sick.</i>	
XV.—India	125
XVI.—Northern Command	128
XVII.—Western Command	130
XVIII.—Eastern Command	132
XIX.—Southern Command	134
XX.—Indian Officers and Indian Other Ranks—Admission ratios (by months) for certain diseases	137
XXI.—Indian Officers and Indian Other Ranks—Admission ratios for certain diseases by stations and districts	138
XXII.—British Officers of the Indian Army—Average strength, admissions, deaths and constantly sick	144
XXIII.—Indian Officers and Indian Other Ranks—Admission and death ratios for certain diseases by commands	146

TROOPS.

XXIV.—Detail of diseases	148
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ABBREVIATIONS.

A.	.	.	Admissions.
A. D. H.	.	.	Assistant Director of Hygiene.
A. D. P.	.	.	Assistant Director of Pathology.
Av. c. s.	.	.	Average constantly sick.
A. H. Q.	.	.	Army Headquarters.
B. M. H.	.	.	British Military Hospital.
B. Os.	.	.	British Officers.
B. O. Rs.	.	.	British Other Ranks.
C.	.	.	Cases.
C. M. %	.	.	Case mortality per cent.
D.	.	.	Deaths.
D. A. D. P.	.	.	Deputy Assistant Director of Pathology.
D. A. H.	.	.	Disordered action of the heart.
G. S. W.	.	.	Gun-shot wounds.
I. O. Rs.	.	.	Indian Other Ranks.
M. Os.	.	.	Medical Officers.
N. C. Os.	.	.	Non-Commissioned Officers.
O. C.	.	.	Officer Commanding.
P.	.	.	Primary.
P. A.	.	.	Per annum.
P. M.	.	.	<i>Per mille.</i>
P. U. O.	.	.	Pyrexia of uncertain origin.
R.	.	.	Revaccinations.
U. K.	.	.	United Kingdom.
V. D.	.	.	Venereal diseases.
V. D. H.	.	.	Valvular diseases of the heart.
%	.	.	Per cent.

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VOLUME II.

SECTION I.

ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

(From the Director of Medical Services in India.)

1. General health statistics of the British Army in India during the year 1937 (excluding the statistics of Burma for three months—January to March—owing to its separation from India) are given in the table below :—

TABLE 1.

1937.	Average strength.	Admissions.		Deaths.		Invalids sent home.		Invalids discharged from service.		Average constantly sick.	
		No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.
Officers	2,055	866	421·4	7	3·41	37	18·00	...	...	28·02	13·64
Other Ranks	47,388	26,008	567·8	102	2·15	520	10·97	...	...	1,280·21	27·02
Numbers of Nursing Service.	...	80	...	...	...	4	...	...	...	4·26	...
Women	4,148	1,328	319·7	15	3·62	42	10·13	...	...	45·95	11·08
Women confinement	...	780	...	2	...	...	...	...	...	30·24	...
Children	6,157	2,206	358·8	79	12·83	16	2·60	...	...	68·78	11·17
Royal Navy	...	108	...	3	...	...	...	...	...	6·49	...
Royal Air Force	2,105	828*	393·8	11	5·23	20	9·50	...	...	24·78*	11·77
R. A. F. Women and Children.	...	73	...	1	...	...	...	...	...	2·36	...
R. A. F. Women confinement.	...	24	...	...	...	...	...	...	...	0·79	...
Royal Indian Marine	...	1	...	...	...	...	...	...	...	0·03	...
Others :											
Men	...	333	...	18	...	...	...	...	...	11·27	...
Women	...	341	...	5	...	11	...	...	...	9·39	...
Women confinement.	...	125	...	1	...	...	...	...	...	4·68	...
Children	...	178	...	4	...	2	...	...	...	4·14	...

* Includes 352 and 17·16 respectively for R. A. F. cases treated in quarters.

The ratios per 1,000 for admissions, deaths and invalids amongst officers and other ranks for the quinquennial periods 1910—14, 1920—24, 1925—29 and 1930—34 with those for 1935, 1936 and 1937 are given separately for purposes of comparison in the following table :—

TABLE 2.

Periods.	Ratio per 1,000.					
	Admissions.		Deaths.		Invalids.	
	Officers.	Other Ranks.	Officers.	Other Ranks.	Officers.	Other Ranks.
1910—14	567·5	567·2	5·14	4·36	16·30	7·03
1920—24	676·7	791·9	6·71	5·24	20·99	18·91
1925—29	589·9	619·4	5·25	2·90	17·44	13·50
1930—34	428·6	604·7	6·69	2·64	20·09	8·88
1935	470·1	567·1	6·74	2·55	24·25	6·90
1936	428·8	582·1	6·17	2·48	22·92	10·99
1937	421·4	567·8	3·41	2·15	18·00	10·97

Officers.

2. 421·4 per 1,000 of strength were admitted to hospital during the year compared with 428·8 in 1936.

The principal causes of sickness were —

Dysentery	64	Fractures	33
Sandfly fever	56	Influenza	33
Malaria	54	Common cold	25
Jaundice catarrhal	46	Contusions	21
Cellulitis	46	Appendicitis	18
Tonsillitis	43	Concussions	15
Diarrhoea	42		

There were seven deaths giving a ratio of 3·41 per 1,000 compared with 14 and 6·17 per 1,000 in 1936.

The causes of deaths were injuries (other than gun-shot wounds) three cases, gun-shot wound one and paratyphoid three, cirrhosis of liver and lipoma each one case.

The average constantly sick in hospital was 28·02 or 13·64 per 1,000 of strength as compared with 31·54 or 13·90 in the previous year.

A total of 1,154 or 561·6 per 1,000 of the strength were treated as out-patients.

Soldiers.

3. There were 26,908 admissions to hospital giving a ratio per 1,000 of 567·8 as compared with 582·1 in 1936 and 580·5 in 1913.

The principal causes of admission to hospital showing the increase or decrease compared with the previous year were —

	1937.	Increase or decrease.		1937.	Increase or decrease.
Malaria	2,111	— 906	Impetigo contagiosa	470	+ 80
Cellulitis	1,957	— 340	Synovitis	456	— 64
Tonsillitis	1,362	— 154	Tinea	387	— 111
Gonorrhoea	1,345	+ 5	Pharyngitis	381	— 181
Dysentery	1,209	— 74	Boils	346	— 127
Sandfly fever	1,167	— 591	Appendicitis	331	— 54
Influenza	776	+ 130	Jaundice Catarrhal	294	+ 15
Bronchitis	774	— 60	Constipation	276	— 63
Diarrhoea	762	— 97	Syphilis	273	+ 59
Sprain and strains	749	— 117	Coryza	272	— 46
Fractures	643	— 118	Soft chancre	269	+ 28
Common cold	643	+ 63	Gastritis	255	— 102
Dengue	576	+ 332	Wounds	232	— 45
Contusions	562	— 125	Urethritis	217	— 28

Five diphtheria "carriers" were admitted to hospital.

There were 102 deaths or 2·15 per 1,000 of the strength compared with 129 or 2·48 per 1,000 in 1936.

The chief causes of death were —

General injuries	23
Infectious diseases	19
Local injuries (including 6 gun-shot wounds)	18
Pneumonia	9
Digestive diseases	8
Urinary diseases	7
Circulatory diseases	6

There were 520 or 10·97 per 1,000 of the strength sent home as invalids compared with 572 or 10·99 per 1,000 in 1936.

The principal causes of invaliding to the United Kingdom were —

	1937.	Increase or decrease.		1937.	Increase or decrease.
Pulmonary tuberculosis	62	— 1	Epilepsy	22	+ 5
Mental diseases, other than schizophrenia	51	—16	Deformities of limbs	18	— 6
Fractures	34	+ 7	Disordered action of the heart	13	+ 3
Diseases of joints	27	—12	Valvular diseases of the heart	12	— 1
Injuries, other than fractures	27	— 5	Rheumatic fever	11	+ 5
Diseases of bronchi and bronchioles	26	+11	Otitis media	11	+ 4
Schizophrenia	22	— 9	Diseases of the urinary organs	10	— 2
			Tuberculosis, other than pul- monary	6	— 3

The average number constantly sick in hospital was 1,280·21 or 27·02 per 1,000 of the strength, compared with 1,399·21 or 26·88 per 1,000 in 1936.

The diseases chiefly responsible were :—

	Average constantly sick.		Average constantly sick.
Gonorrhœa	178·55	Impetigo contagiosa	23·94
Malaria	80·80	Syphilis	23·69
Cellulitis	67·20	Sandfly fever	23·08
Dysentery	58·36	Sprain and strain	21·08
Fractures	50·52	Influenza	18·40
Bronchitis	37·13	Diarrhœa	17·99
Tonsillitis	32·71	Synovitis	16·95
Soft chancre	26·18	Jaundice catarrhal	16·35
Appendicitis	23·74	Contusions	15·83

A total of 73,941 men, or 1,560·3 per 1,000 of the strength were treated as out-patients. The average daily number under treatment was 1,128·00 or 23·78 per 1,000.

The combined ratio of constantly sick in hospital and under treatment as out-patients was 50·80 per 1,000 of the strength, compared with 50·10 in 1936.

The actual loss to the Army in India in working days was 467,277 due to sick in hospital and 411,720 due to sick in barracks, making a total of 878,997 days compared with 954,539 in 1936.

The admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India, are shown in the table on pages five and six.

PRINCIPAL DISEASES AFFECTING THE BRITISH ARMY.

Health of the Army in India during 1937.

4. 1937 has been, from the health aspect, a good year for both British and Indian troops. There was a reduction in hospital admissions among both groups as compared with 1936 (also a good year), of 14·3 per 1,000 of strength among British troops, and 37·0 per 1,000 of strength among Indian troops. The admission ratio appears generally to be on the downward trend and although an improvement on that of previous decades, (in 1920 it was 1,071·5 per 1,000 for British troops and 762·3 per 1,000 among Indian troops), cannot be considered satisfactory according to modern health standards as long as approximately 568 out of every 1,000 British soldiers and 390 out of every 1,000 Indian soldiers are admitted to hospital during the course of a year. When compared with the admission ratio to hospital among the troops in the United Kingdom the ratio in India is found to be almost exactly double. The reasons are partially climatic, and partially due to the more primitive methods of sanitation, particularly with regard to conservancy, available not only for the army, but also for the civil populations in contact with them. Education, finance and time are the three main factors concerned given the will to gradually progress up to modern standards. It is satisfactory to record in addition to the drop in hospital admissions a reduction in the average constantly sick, death and invaliding rates.

An encouraging feature during the past few years and particularly during 1936 has been the reduction in incidence of such diseases as malaria and the enteric group of fevers.

TABLE 8.

Table showing total admissions and deaths ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

	Strength	Stations with total admission ratios higher than all-India.				All-India.
		Peshawar.	Quetta.	Meerut.	Mhow.	
All causes.	. . . {A. D. Av. c. s.	1,274 900·3 8·14 41·62	1,561 818·7 1·92 31·89	1,883 707·7 2·97 30·83	1,450 591·0 1·38 25·91	47,383 567·8 2·15 27·02
Malaria . . .	{A. D.	81·6	194·7	26·1	90·3	44·5 0·04
Sandfly fever . .	{A. D.	179·7	3·8	...	...	24·6
Enteric group of fevers .	{A. D.	1·6	...	1·2	...	0·8 0·08
Dysentery . . .	{A. D.	44·7	30·1	45·8	17·9	25·5 0·04
Diarrhoea . . .	{A. D.	13·3	39·7	0·50 30·3	17·2	16·1
Influenza . . .	{A. D.	...	3·2	69·5	23·4	16·4
Pneumonia (lobar and lobular).	{A. D.	3·9	2·6	1·2	4·8	3·2 0·19
Veneral diseases . .	{A. D.	39·2	32·0	20·1	14·5	40·4
Minor septic diseases .	{A. D.	57·3	42·9	64·8	69·7	54·6
Local injuries . . .	{A. D.	83·2	62·1	87·9	40·7	57·6 0·28
Heat stroke . . .	{A. D.	0·78	...	0·59	0·60	0·2 0·13
Heat exhaustion . .	{A. D.	0·78	0·6	1·2	...	0·8 0·04

A.—Admissions.
D.—Deaths.
Av. c. s.—Average constantly sick.

TABLE 3—contd.

Table showing total admissions and deaths ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

Stations with total admission ratios lower than all-India.											
	Karschi.	Lucknow.	Jubbulpore.	Stalkot.	Poona.	Secunde- rabad.	Rawal- pindi.	Bangalore.	Ranikhet.	All-India.	
Strength	1,808	2,419	1,379	1,245	2,435	2,546	1,982	1,048	1,114	47,388	
All causes	{ A. D. Av. c. s.	{ 562.2 2.07 25.91	{ 532.3 7.98 29.33	{ 450.1 3.21 19.37	{ 528.1 1.64 39.92	{ 510.6 1.96 25.09	{ 502.0 4.04 22.10	{ 450.4 0.95 27.07	{ 402.2 1.80 30.73	{ 567.8 2.15 27.02	
Malaria	{ A. D.	{ 71.7 10.7	{ 84.8 ...	{ 0.8 24.1	{ 45.6 ...	{ 12.6 9.8	{ 66.6 0.50	{ 9.5 1.9	{ 7.2 ...	{ 44.5 0.04	
Sandfly fever	{ A. D.	{ 22.1 74.0	{	{	{	{	{ 48.9 ...	{ 1.9 ...	{	{ 24.6 ...	
Enteric group of fevers	{ A. D.	{ 0.5 ...	{ 0.7 0.73	{ 2.4 ...	{ 1.2 ...	{	{	{	{ 1.8 0.90	{ 0.3 0.08	
Dysentery	{ A. D.	{ 24.5 32.2	{ 21.8 ...	{ 14.5 0.80	{ 37.8 9.0	{ 28.3 9.4	{ 18.2 5.5	{ 34.4 7.6	{ 35.0 6.3	{ 25.5 16.1	
Diarrhoea	{ A. D.	{ 21.1 26.9	{ 14.5 ...	{ 27.3 ...	{ 9.0 ...	{ 9.4 ...	{ 5.5 ...	{ 7.6 ...	{ 6.3 ...	{ 16.1 ...	
Influenza	{ A. D.	{ ... 23.6	{ ... 6.5	{ 37.8 ...	{ 17.7 ...	{ 0.4 ...	{ 13.1 ...	{ 1.9 ...	{ 44.9 ...	{ 16.4 ...	
Pneumonia, (lobar and lobular).	{ A. D.	{ 1.6 0.83	{ 2.2 ...	{ 3.2 ...	{ 4.1 ...	{ 5.9 0.39	{ 5.5 1.01	{	{ 0.9 ...	{ 3.2 0.19	
Veneral diseases	{ A. D.	{ 50.1 34.7	{ 45.7 ...	{ 24.9 ...	{ 32.4 ...	{ 33.4 ...	{ 30.8 ...	{ 42.0 ...	{ 9.0 ...	{ 40.4 ...	
Minor septic diseases	{ A. D.	{ 33.5 43.8	{ 55.8 ...	{ 52.2 ...	{ 57.5 ...	{ 56.6 ...	{ 52.0 ...	{ 46.8 ...	{ 35.9 ...	{ 54.6 ...	
Local injuries	{ A. D.	{ 46.4 0.53	{ 37.7 ...	{ 52.2 ...	{ 46.8 0.82	{ 80.5 0.39	{ 42.4 1.01	{ 52.5 ...	{ 44.9 ...	{ 57.6 0.38	
Heat stroke	{ A. D.	{	{	{ 2.4 0.80	{	{	{	{	{	{ 0.3 0.13	
Heat exhaustion	{ A. D.	{	{ 3.6 ...	{ 1.6 ...	{	{ 0.8 ...	{ 2.0 ...	{	{	{ 0.6 0.04	

A.—Admissions.

D.—Deaths.

Av. c. s.—Average constantly sick.

5.

Malaria.

TABLE 4.

		Admission ratios per 1,000.				
		1933.	1934.	1935.	1936.	1937.
Northern Command	Fresh.	120.2	40.2	44.1	45.6	30.2
	Relapse.	39.6	35.6	13.2	32.8	15.3
	Total.	159.8	75.8	57.3	78.5	45.6
Eastern Command	Fresh.	43.8	33.7	31.4	30.5	14.9
	Relapse.	18.8	14.4	13.4	6.3	9.0
	Total.	62.6	48.1	44.8	36.8	23.9
Southern Command	Fresh.	48.5	41.6	38.8	36.3	34.2
	Relapse.	12.2	13.7	10.2	9.0	9.0
	Total.	60.6	55.3	48.9	45.3	43.2
Western Command	Fresh.	175.9	100.5	111.3	56.8	101.5
	Relapse.	28.1	59.9	24.8	47.1	22.0
	Total.	204.0	160.4	136.1	103.9	123.5
All India*	Fresh.	79.1	43.3	43.1	39.2	32.6
	Relapse.	24.2	24.2	13.1	18.7	12.6
	Total.	103.3	67.5	56.1	58.0	44.5

The malaria incidence during 1937 is the lowest yet recorded for the British troops in India and nearly one-third less than in 1933. The ratio per 1,000 would have been even lower, had it not been for an increase of 20 per 1,000 in Western Command. It was estimated that at least 50% of the cases among the Quetta garrison were contracted during the training season, nets not having been used. The incidence in this station rose from 113 (1936) to 194 per 1,000 in 1937.

The low incidence of malaria for all-India was undoubtedly helped by favourable weather conditions, particularly in the north. In that area August was an unusually dry month, and in July and October there was rather less rain than usual. Cold weather also set in earlier in the autumn than is customary. In Eastern Command, the monsoon was late, deficient in certain areas and patchy in others.

In the plains generally there were heavy rains from June to August and then a prolonged break. From October until the retreat of the monsoon in December there was again a slight excess of rainfall over the plains as a whole.

The systematic and careful anti-malaria work carried out annually in stations seems to be reaping its reward. Large sums of money must perforce be spent annually on antilarval measures, and spraying of barrack rooms, etc., which could probably be considerably reduced if more money for major permanent works was available. The sums required however for this purpose are very great, and in practice can only be spread over very many years. In addition unless similar work is carried out conjointly in civil areas adjoining the military, large expenditure might easily lead to small results. Co-operation between civil and military authorities in the way of joint committees, etc., is however increasing, is working well in certain stations, and it is hoped will improve as years go on. In Northern Command a large proportion of the troops were engaged in operations in Waziristan. Their figures for malaria are not included in the above table but dealt with separately later in this report. Presuming however that the figures for Waziristan would under peace conditions have been the same as in 1936, the ratio per 1,000 would only have been 46.6.

*1937 does not include Burma.

The ratio per 1,000 of relapses for all-India is also just less than half of that in 1933, and there is little doubt that this is mainly due to the plasmoquine now invariably combined with quinine or given after the atebirin course of treatment.

The downward trend of the malaria incidence and relapse ratio in Northern Command since 1926 is shown in table 5.

TABLE 5.

Year.	Northern Command.	
	Total malaria admissions. (ratio per 1,000).	Relapse malaria admissions. (ratio per 1,000).
1926	268.60	177.98
1927	208.00	140.93
1928	112.19	75.43
1929	193.46	69.14
1930	205.79	122.75
1931	138.40	76.44
1932	91.15	50.13
1933	158.13	39.72
1934	75.32	36.68
1935	57.13	13.73
1936	78.18	33.01
1937	45.14	15.73

There were only three stations with strengths of over 500 in which malaria admissions exceeded 100 per 1,000, *viz.*, Quetta 194.7, Multan 116.5 and Hyderabad 103.8. In Delhi the annual decrease in admissions continues, the ratio for 1937 being 52.9 per 1,000 as compared with 71.6 per 1,000 in 1936 and 87.5 per 1,000 in 1935. This reflects much expenditure and work carried out in the area round Delhi Fort and in old Delhi under the control of the Malaria Institute of India.

TABLE 6.

		Malaria.					
	Year.	B. T.	M. T.	Quartan.	Mixed.	Clinical.	Total.
Northern Command	1936	1,087	172	3	11	51	1,324
	1937	486	111	3	9	27	636
Eastern Command .	1936	440	99	2	8	28	577
	1937	304	43	3	3	7	360
Southern Command.	1936	409	178	32	17	23	659
	1937	408	162	12	20	18	620
Western Command .	1936	297	23	1	7	5	333
	1937	343	134	2	6	10	495
Total . . .	1936	2,233	472	38	43	107	2,893
	1937	1,541	450	20	38	62	2,111

The decrease in Northern Command is mainly in *P. vivax* infections, whereas in Western Command *P. falciparum* infections have greatly increased. It is possible that this latter may be associated with the influx into Quetta of the large numbers of labourers employed on reconstruction work. There were two deaths from malaria among British troops during 1937, one at Muttra and one at Rawalpindi.

Treatment was carried out sometimes with quinine and plasmoquine but mainly now with atebirin followed by plasmoquine. In view of the shorter course of treatment involving a briefer stay in hospital the latter combination is more generally favoured in the military hospitals. This method of treatment is supplemented in some instances by quinine alone for the first 48 hours, with a view to the more rapid reduction in temperature, which in certain cases occurs with quinine. On the other hand certain medical specialists with great experience in both methods of treatment, have expressed the view that as long as pyrexia causes no anxiety, preliminary quinine is unnecessary, and that patients, to whom quinine is not administered initially, look fitter at the end of their course of treatment.

It is of interest that the adverse comments expressed in the report of the Health Organisation of the League of Nations in 1933 with regard to the findings in the military hospitals in India of the anti-relapse factor present in plasmoquine have been retracted in the fourth general report of the Malaria Commission. The small nontoxic doses of plasmoquine used in these experiments had also been adversely criticised in the former report. In both respects the investigation carried out under the auspices of the Malaria Commission have confirmed in every respect the careful initial work carried out in the military hospitals in India. In view of the great annual reduction in malaria incidence since the use of the synthetic drugs for the army in India, confirmation seemed hardly necessary to those really experienced in the new, as compared with the old, methods of treatment.

In field medical units engaged in the Waziristan Operations atebirin musonate injections were again very extensively used as a preliminary treatment. Again excellent results were obtained, pyrexia being either considerably reduced or abolished within 24—48 hours in the majority of cases. Cases so treated were also more comfortable in their journey down the lines of communication, and arrived in better condition in the base hospitals than those treated with quinine or atebirin by the mouth. Instructions were issued that this preliminary treatment was purely temporary and that after arrival in hospital all cases were to commence their full course of atebirin, *e.g.*, 0.3 gm. daily for seven days; interval of three days; plasmoquine grammes 0.03 for British troops and 0.02 grammes for Indian troops daily for five days.

At the request of Professor W. Schulemann experiments were carried out during 1936, and early 1937 with a synthetic preparation originally called Cilional now named Certuna. Experiments were carried out in the British Military Hospitals, Rawalpindi, Poona, Peshawar and Quetta; treatment under control of the specialist in medicine and the microscopic work by the Deputy Assistant Director of Pathology in each of these stations. The drug was to be given in 0.06 gramme doses combined with 0.3 gramme atebirin daily for seven days. If successful it would have resulted in diminishing considerably the period of hospitalisation per case.

In Rawalpindi 64 cases were treated (B.T. 44, M.T. 20). Of 45 cases which could be followed up (30 B.T., 15 M.T.) there were 30% of relapses among the benign tertian group, and 46.6% relapses among the malignant tertian group within six months. Blood smears were negative to parasites by the 3rd day in the great majority. In two of the M.T. cases parasites were present up to the 4th day.

In Peshawar 52 cases were treated (B.T. 36, M.T. 16). Relapses occurred in 61.1% of the B.T. cases, and 43.75% of the M.T. cases. It was noticed that the relapses were milder than the original attacks, and parasite persistence

in the blood was decreased as compared with the primary attack. In benign tertian cases parasites persisted on an average of 3.94 days. *P. vivax* gametocytes were found in seven cases on 2nd day, and in two on 3rd day of treatment. The average duration of pyrexia was 1.91 days; longest five and shortest one day.

In malignant tertian cases the average duration of parasites was 5.68 days; longest seven, and shortest one day. No gametocytes were found. Relapses occurred within one to 48 weeks, 18% within one month, and 26% under three months.

In Quetta 38 cases were treated (B.T. 34, M.T. three, Q. one). In addition 18 cases received preliminary quinine prior to this treatment and are therefore discarded from the results.

The relapse rate was 15%. In certain cases treated with cilional alone it was considered that cilional had a definite destructive action on gametocytes, but none on trophozoites.

Certain additional cases were treated later bringing the total treated to 44.

Of 14 B.T. cases in which gametocytes were present 8 were treated with atebirin and cilional and six with cilional alone. In the further group in only one case were gametocytes present on the 4th day of treatment and none were found on the 5th day. Among the six cases treated with cilional alone gametocytes were found in two cases on the 4th day and in one case on the 5th day. Trophozoites had all disappeared in the atebirin cilional group before the 5th day, but in half those treated with cilional alone trophozoites were present at the end of the prescribed course.

In Poona 44 cases were treated (B.T. 21, M.T. 16, Q. three, Mixed four). The relapse rate was 17.7%, among fresh infections 14.8%, and among relapse cases 25%. Parasites disappeared from the blood by the 2nd day in the great majority of the cases, in two cases they were found on the 3rd day, and in two cases on the fourth day. *P. vivax* gametocytes were seen in six of the cases, and in one case persisted up to the 4th day. No *P. falciparum* gametocytes were found in any case.

A further series of cases was treated at a later date in Poona, as the results here appeared rather more encouraging than those from Northern Command but the relapse rate in this latter series was much higher, and similar to that in Northern Command.

As the result of the above experiments it was clear that Cilional or Certuna has no anti-relapse factor, such as is the case with plasmoquine. The effect on *P. vivax* gametocytes was slight, and probably less destructive than atebirin. It was quite clear however that the drug was non-toxic either alone or in combination with atebirin, very definitely prevented the development of gametocytes of *P. falciparum* and probably destroyed the latter if present. It is considered therefore that the best role for this drug, in view of its non-toxicity, is for issue to populations where *P. falciparum* is the predominant strain. For troops where the prevention of relapses is especially important from the service point of view it is unsuitable.

From extracts of reports from Professor A. Missiroli kindly supplied by Dr. O. Urchs, M.D., it is clear that Professor Missiroli, who carried out very large scale experiments, arrived at similar conclusions. The incidence of malaria among the troops engaged in the Waziristan Operations in 1937 is referred to fully elsewhere in this report. One or two important points were investigated and have given promising results.

In view of the difficulty of its carriage on the soldier and the very frequent adverse reports on the paraffin citronella oil, which has been in use for so many years, and antimosquito cream consisting of Oleum citronella 5 ozs., camphor $\frac{1}{4}$ oz., cedarwood oil $2\frac{1}{2}$ ozs., paraffin durum $7\frac{1}{2}$ ozs., paraffin molle white $12\frac{1}{2}$ ozs., was issued to troops in aluminium screw top containers, 1 oz. in capacity. Unfortunately both cream and containers came into general use after the peak of the malaria season in that area had been passed, but reports from all were unanimous that the cream is a great advance on any previous culicifuge preparation, and was not only most effective against mosquitoes but against sandflies also. Steps have therefore been taken to have the paraffin citronella oil replaced as an authorised issue on an as required basis by the cream for peace periods as well as war, and also to make the aluminium containers a general issue to troops on a 25% basis for use of sentries, roving patrols, and generally for troops during training periods when nets are not in use. A large trial was also carried out with a so-called "B" pattern bivouac mosquito net, which is particularly useful for use in either 160 lb. or 80 lb. tents for which the ordinary peace time net is most unsuitable. These also were in general use rather late in the operations, but the results were excellent, and it is hoped that this net with slight modifications, strengthening corners etc. will in due course be available not only for units engaged in field operations in war, but also during training in peace time in the malaria season, when so many of the malaria infections occur.

Enteric group of fevers.

6. The incidence of the enteric group of fevers among British and Indian troops is shown in table 7.

Enteric fevers.

TABLE 7.

		British.											
		1935				1936				1937			
		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid		27	8	0.5	0.15	14	2	0.3	0.04	6	3	0.1	0.06
Para. A		13	...	0.2	...	13	...	0.2	...	2	...	0.04	...
Para. B		...	...	...	...	1	...	0.02	...	2	...	0.04	...
Para. C		...	...	...	...	1	...	0.02	...	...	...	...	...
Enteric group.		68	1	1.3	0.02	47	1	0.9	0.02	26	1	0.5	0.02
Total		106	9	2.0	0.17	76	3	1.5	0.06	36	4	0.8	0.08

		Indian.											
		1935				1936				1937			
		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid		55	8	0.5	0.07	29	3	0.2	0.03	36	6	0.4	0.06
Para. A		46	3	0.4	0.03	14	...	0.1	...	23	1	0.2	0.01
Para. B		1	...	0.01	...	1	...	0.01	...	...	...	...	...
Para. C		...	...	...	...	...	...	...	...	...	...	...	...
Enteric group		62	2	0.5	0.02	38	2	0.3	0.02	29	1	0.3	0.01
Total		164	13	1.4	0.11	77	5	0.7	0.04	88	8	0.9	0.08

That for British troops is well below that of 1934, which was the lowest ever recorded, and less than half that of 1936 which was also low.

The reduction in the number of paratyphoid A. cases is also welcome as in the past few years the total cases, although comparatively few had not diminished in similar proportion to the typhoid cases.

Three deaths occurred among the typhoid cases (two broncho-pneumonia, one severe bronchitis and myocarditis).

One death occurred among the enteric group cases from severe toxæmia and acute nervous symptoms on the 6th day after reporting sick. Agglutination reactions on the 5th day were marked to T. A. B. H. & T. O., but this may have been accounted for by inoculation with T. A. B. vaccine seven weeks previously. The case clinically seems to have been very suspicious of a very severe and fulminating typhus infection rather than enteric fever but unfortunately agglutination tests against proteus "O" were not carried out at the same time as T. A. B. agglutination. The absence of any rash in an appreciable number of all three groups of endemic tropical typhus in India even in the most severe cases needs to be borne in mind by all medical officers.

The incidence among Indian troops was not as low as in 1936 although less than half that in 1934, the record year at that time. Enteric fevers were severe in many parts of India during the year particularly in the Punjab and the seven typhoid and nine paratyphoid cases more than 1936 undoubtedly reflect the incidence among the civil population with whom naturally contact is greater among Indian than British troops. Several of the infections were actually contracted while on leave in villages.

Extensive serological investigations were carried out during the year in the military laboratories in connection with these fevers, with a view to ascertaining whether a modified Felix agglutination technique would give more reliable results than Dreyer's technique with T. O. suspensions in inoculated individuals. This threw much extra work on laboratory staffs and time has not yet been available to compile all the reports received from the laboratories in detail. This matter is referred to more fully in the section on pathology but it may be stated in brief that the Felix method gave hopes of much better results, and it will be employed in future.

The seasonal distribution by commands is shown in Table 8 and is similar to that of previous year.

TABLE 8.

Seasonal distribution per cent. of the enteric group of fevers—British and Indian troops.

Command.	Number of cases.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Northern	68	4.8	4.8	1.6	6.8	17.5	25.4	7.9	11.1	11.1	6.8	1.6	1.6
Southern	21	4.8	14.3	14.3	...	9.5	...	4.8	14.3	4.8	14.3	9.5	9.5
Eastern	32	6.2	6.2	8.1	21.9	12.5	15.6	3.1	9.4	9.4	6.2	3.1	3.1
Western	8	12.5	...	...	12.5	12.5	25.0	12.5	12.5	12.5	...	...	...
All-India	124	5.6	6.4	4.0	9.7	14.5	18.5	6.5	11.3	9.7	7.3	3.2	3

TABLE 9.

Incidence, death rate and case mortality of typhoid fever among British soldiers with under one year's service and over one year's service in India.

	Under one year in India.						Over one year in India.					
	Strength.	Cases.		Deaths.		Case mortality %.	Str.	Cases.		Deaths.		Case mortality %.
		Actu- als.	Ratio per 1,000.	Actu- als.	Ratio per 1,000.			Actu- als.	Ratio per 1,000.	Actu- als.	Ratio per 1,000.	
Average for 1929-1933 .	10,632	30.2	2.84	7.2	0.68	23.84	44,814	32	0.71	3.6	0.08	11.24
Average for 1934-1935 .	10,909	7	0.65	2	0.18	28.57	42,628	20	0.47	4.5	0.11	22.5
1936 .	9,711	6	0.62	...	...	...	42,348	8	0.19	2	0.05	25
1937 .	8,533	...	...	...	...	...	58,855	6	0.15	3	0.08	50

It will be noted that although the numbers of cases is very small, for the first time no cases have occurred among British soldiers with under one year's service in India. No explanation for this or the reduced number of cases is known except the enhanced effects of the T. A. B. vaccine now issued by the R. A. M. College, Millbank.

TABLE 10.

Enteric fevers—Periods after inoculation at which infection occurred.

	Total enteric group of fevers			Typhoid cases bacteriologically proven.		
	0-6 months.	6-12 months.	12-18 months.	0-6 months.	6-12 months.	12-18 months.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1929 .	32.2	50.5	17.5	31.2	58.3	10.4
1930 .	37.6	43.6	18.8	32.7	46.6	20.7
1931 .	35.4	35.4	29.2	34.4	34.9	30.2
1932 .	33.7	38.0	28.2	30.9	45.4	23.6
1933 .	32.0	44.0	24.0	25.0	45.8	29.2
1934 .	33.7	35.1	31.1	40.0	24.0	36.0
1935 .	30.0	43.3	26.6	21.7	43.4	34.7
1936 .	32.3	40.0	27.7	15.4	30.8	53.8
1937 .	29.6	40.7	29.6	..	50.0	50.0

It will be seen from the above table that, although the incidence among the enteric group of fevers remains much the same in the six monthly periods after inoculation as in previous years, among the definite typhoid cases there has been an increase in the percentage occurring in the 12-18 months period. It has been decided, while retaining the 0.5 and 1 c.c. dose of T. A. B. at ten day intervals for primary inoculation, to reinoculate at the end of the first 12 months with 0.5 c.c., and continue with this dose at 12 monthly intervals during service in India.

TABLE 11.

Fevers of the enteric group—Inoculation state among B. O. Rs.

Group.	Strength.	Actuals.		Ratio per 1,000.		Case mortality. per cent.
		Cases.	Deaths.	Cases.	Deaths.	
Protected .	47,666	27	4	0.56	0.08	14.81
Unprotected .	587	9	..	15.33	..	..

TABLE 12.

Incidence of fevers of the enteric group among protected and unprotected officers, other ranks, women and children.

		Average strength.	Admissions.					Total.
			Typhoid.	Para. A.	Para. B.	Para. C.	Enteric group.	
Officers (British and Indian service)	Protected .	3,727	1	1	2	..	1	6
	Unprotected	179	..	..	1	..	..	
British other ranks.	Protected .	47,666	6	1	1	..	19	36
	Unprotected	587	..	1	1	..	7	
Women	Protected .	5,494	1	..	..	..	..	3
	Unprotected	260	1	..	..	..	1	
Children	Protected .	6,575	..	..	..	..	1	4
	Unprotected	726	2	1	..	..	..	

Fevers of the Typhus Group.

TABLE 13.

7.

	1933		1934		1935		1936		1937	
	Adms.	R. per 1,000	Adms.	R. per 1,000	Adms.	R. per 1,000	Adms.	R. per 1,000	Adms.	R. per 1,000
British troops .	23	0.4	52	1.0	19	0.4	44	0.8	29	0.6
Indian troops .	19	0.2	51	0.4	45	0.4	47	0.4	43	0.5

Twenty-nine cases occurred among British troops as compared with 44 in 1936. In addition 43 cases were diagnosed among Indian other ranks, four less than in 1936. Again the cases fall into the two main groups of scrub typhus (*Proteus* OXK) and urine typhus (*Proteus* OX 19), with a smaller number giving definite diagnostic high titres of agglutination to *Proteus* (OX 2); finally an even smaller number in which although the clinical symptoms were typical no adequate serological evidence was obtained, or else a general rise in agglutination titre prevented definite classification.

The distribution of 77 cases by Commands including 5 other than British or Indian Other Ranks was as follows:—

	Northern.		Eastern.		Southern.		Western.		Total.
	B.	Ind.	B.	Ind.	B.	Ind.	B.	Ind.	
XX	13	5	5	1	3	1	..	..	28
X19	3	10	..	4	4	15	..	1	37
X2	..	..	1	..	1	6	..	..	8
Unclassified	..	..	1	..	..	2	..	1	4
Total	16	15	7	5	8	24	..	2	77

In the OXK group 13 of the 21 cases occurred in hill or semi-hill stations, seven in the Simla hill stations as compared with 20 in 1936. Ten were from hill

R. Rate B. British Ind. Indian.

stations (August, September, October) and three from semi-hill stations (January, February, June). Of the 15 arising in plain stations 10 occurred between August and February (cool period of the year), and five between April and July. Among the British cases a rash was present in only 57 per cent. This varied in character between a few rose spots on the chest, mild erythema of chest and abdomen, macular rash mainly confined to the trunk and finally to a papular rash all over the body and involving the face and limbs. In the great majority of cases it appeared between the fourth and sixth day. Rash was present in only one of the seven Indian cases. Pyrexia varied from 5-18 days; in 50% lasting ten days or under. In only 24% of the British cases were the symptoms severe, although one or two other cases exhibited drowsiness, lethargy etc. for a few days after onset of the fever. Venous thrombosis occurred in two cases, broncho-pneumonia in one, and lobar pneumonia in another. There was one death. The few Indian cases were definitely more severe (71%) and two deaths occurred.

The end point of agglutination varied on the average as in previous years from a titre of 1/125 to 1/20,000. In 10% the end point was below 1/100 in undoubted clinical cases. In 47% of the cases titres of over 1/1,000 occurred. In only two cases was there any history of insect bites sufficient to impress the fact on the patient, and in none was there any history of bites of ticks. Evidence now over a series of years is overwhelmingly against the tick being anything more than a rare vector of the disease, if even that. The few odd cases in which the "tick" seems to have been incriminated seems to have been only a coincidence, and the minor irritation caused by the true vector has probably been lost sight of by a patient normally accustomed to bites from mosquitoes, sandflies, fleas etc., largely disregarded as necessary minor evils of every day life in India. That *trombicula deliensis* may be largely concerned was discovered by an R. A. M. C. officer, who, while on a shooting expedition in the Simla hills area, was bitten severely on the legs by some small insect. On examination at the Central Research Institute, Kasauli, of the stockings he had worn, these were found to contain numerous *Trombicula deliensis*. Twenty-eight days later in Poona he developed a severe attack of scrub typhus (17 days pyrexia, and a titre of agglutination to *Proteus* OXK of 1/20,000). Unfortunately fearing infection, he had himself injected with the blood of a 12 day afebrile convalescent typhus patient 18 days before his own attack commenced, thus interfering with the chain of evidence pointing to *trombicula* as a vector.

It may be noted that the majority of the scrub typhus cases annually occur among British troops in hill areas and in the autumn months. The lower incidence among Indian troops is presumably due to the fact that only British troops in any numbers proceed to hill stations during the hot weather and autumn. In plain stations such few infections as occur are mainly confined to the cooler months of the year.

Proteus OX 19 group.

Seven cases occurred among British troops, all in plain stations. There were 30 cases among Indian Other Ranks, which, with the exception of two from semi-hill stations (Quetta, Dehra Dun), were also from plain stations.

In Northern Command seven of the 10 cases occurred in the post monsoon period September to November, whereas in Southern Command the cases were equally distributed between April-June and September-November, pointing to flea infection.

Macular rash was present in six of the eight British cases, becoming papular in two, and in two the entire body was involved including the face. Macular or maculopapular rashes occurred in six of the thirty Indian cases. One British and six Indian cases were moderately severe. The remainder were mild although in a few drowsiness was present for a few days. Headache, pharyngitis, bronchitis (in a few cases), body pains, and constipation are, as usual, the only signs and symptoms present apart from pyrexia. In the great majority headache and body pains initially were the only symptoms apart from the fever. Pyrexia varied from 6—18 days, 25 of 47 cases the period of pyrexia was 10 days or under. Eight of these cases were definitely infected while on leave in their villages.

In only two of the cases was any history obtained of known bites (1) bugs (2) "unknown insect producing irritation of toe resembling that caused by a mosquito bite."

There were no deaths; nor was there any difference between the cases in Northern or Southern Command suggestive of distinctive types of the disease peculiar to any particular area.

Proteus OX 2 group.

Two British and six Indian cases fell into this serological group. Macular rash was present in five cases; the symptoms were as above and the majority were mild in type (two moderately severe). Serological tests were clear cut, suggesting no particular relationship to the OX 19 cases, and the titres of agglutination to *Proteus* OX 2 were high.

As in previous years anamnestic reactions in T. A. B. "H" agglutinins were prominent in all three groups and a large proportion of the cases in each group would have been included in the enteric group of fevers a few years ago both on serological and clinical evidence, and a proportion of others probably in the pharyngitis or bronchitis group of diseases.

Dysentery, Diarrhoea, Colitis and Amoebic Hepatitis.

TABLE 14.

8. Incidence of Dysentery, Diarrhoea, Colitis and Amoebic Hepatitis during 1933-1937.

	Dysentery.		Diarrhoea.		Colitis.		Total.		Amoebic Hepatitis.		Liver abscess.	
	Admn.	Ratio per 1,000	Admn.	Ratio per 1,000.	Admn.	Ratio per 1,000.	Admn.	Ratio per 1,000.	Admn.	Ratio per 1,000.	Admn.	Ratio per 1,000.
1933	1,369	24.9	842	15.3	53	1.0	2,264	41.2	36	0.65	7	0.13
1934	1,389	25.5	811	14.9	42	0.8	2,242	41.2	52	0.93	5	0.09
1935	1,536	29.2	734	13.9	19	0.4	2,289	43.5	24	0.46	4	0.08
1936	1,283	24.6	859	16.5	49	0.9	2,191	42.1	15	0.29	2	0.04
1937	1,209	25.5	762	16.1	14	0.3	1,985	41.9	11	0.23	3	0.06

The dysentery admission ratio for all-India has again slightly increased by 0.9 per 1,000. Concurrently the diarrhoea and colitis group were slightly reduced, bringing the ratio of admissions for this whole group similar to that of previous years. Commands showing increased dysentery figures were Northern, Eastern and Southern. In Western Command although there is a reduction on the previous year's figures, the ratio per 1,000 was still high (28.44 per 1,000).

The ratio per 1,000 of amoebic hepatitis cases has again been reduced and is one third less than in 1933. There were three cases of tropical abscess of the liver during the year, and no death. Actually one death occurred from multiple abscesses of the liver, but these were pyaemic and streptococcal in origin. During the seven year period 1920-1926 the average cases per annum were 30·6 with an average of 8·4 deaths in each year. During the seven year period 1927-1933 the average cases per annum dropped to 9·8 and the average deaths to 1·2. During the four year period 1934-37 the average cases per annum have again dropped to 3·5 with an average of 0·75 deaths. The steady drop in the amoebic hepatitis and liver abscess cases is interesting in view of the constant high figure for the bacillary dysentery infections over so long a period of years, and in view of the latter being undoubtedly fly-borne, seems to indicate that the fly cannot be, as is so constantly stated, a major vector in the spread of amoebic dysentery. During this period the only hygienic advance of importance seems to have been the much greater attention paid to drinking water supplies for troops and the universal use of chlorination, where these, as is usually the case, are doubtful. It seems therefore that chlorination must have a greater effect on the cysts of *E. histolytica* than is generally supposed. The examination for cyst carriers among menials has definitely relaxed during the period also without any increase in incidence.

In Quetta investigations, similar to those carried out in Poona several years ago, were made. In brief they consisted in the bacteriological examination of casual specimens of mucus from bazaar and servants' latrines, the situation of the latrine being studied along with the situation of the dysentery cases in barracks. As previously found in Poona, dysentery bacilli were isolated from the majority of these specimens and the location of the dysentery cases in barracks corresponded, and in degree according to the prevalence of flies. In previous reports the relation of this disease to the conservancy system in cantonments and the insanitary bazaar areas in proximity to troops lines have been stressed. Assistant Director of Hygiene, Southern Command, writes:

"The military population is very close to the city with a population of 250,000. It has also a very large Sadar Bazaar of 32,000 people. The villages are also in extremely close proximity. With the exception of the Sadar Bazaar none of these is under military control.

In a village (within 500 yards of the Somerset Lines) numerous dysentery stools may be seen lying on the ground any day. Flies are present in millions and rats abound. Representations have been made year after year to have this village placed under Cantonment authority without success.

The Sadar Bazaar is a city itself and should have its own Public Health Service, whereas it has the same organisation as a much smaller cantonment. Endeavours have been made to introduce water-borne sewage for the last 13 years. Schools are without latrine accommodation and hundreds of buffaloes which provide milk to the civil population are herded together in sheds surrounded at 10 feet distance by houses. The whole bazaar is grossly overcrowded. In addition during the months of August to October there is a large influx of race horses, owners, trainers, stable boys etc. which still further increase the overcrowding in Cantonments as a whole".

The remarks of Assistant Director of Hygiene & Pathology, Northern Command, are somewhat similar.

"There has been little if any tendency for this disease group to decrease in incidence over the last eight years—yet this is a strictly preventable group

of diseases. The explanation of our failure would seem to be mainly in the insanitary conditions of the civil populations living in bazaars which so closely surround and indeed very often intrude into the barracks occupied by the British Troops. In these bazaars flies not only breed freely but find ample opportunity for disseminating dysentery and diarrhoea by feeding alternatively on human faeces and human food. The disease spreads from this reservoir to the troops either by infected flies invading barracks and contaminating food or by Indian carriers whether acute or chronic (and during the warm weather the acute carrier suffering from ambulatory dysentery among the bazaar population is common) contaminating with infected fingers the soldier's food in barracks, or in eating places in the bazaars. Our main object therefore would seem to be to abolish the fly; but in India this is a well nigh impossible task, especially in the bazaars. It can hardly be disputed that in the long run our objective should be to put on a modern footing bazaar sanitation particularly the disposal of human faeces, animal manure and refuse."

Hygiene authority has been pointing this out for many years, but for various reasons instead of more rigid control in such areas, the modern tendency seems to lean towards relaxing rather than strengthening such small control as already exists. Not only dysentery but other diseases such as malaria, sandfly fever, cholera, plague and the enteric group of fevers come obviously into the same picture.

The source of infection to the fly is undoubtedly the type of public latrines in bazaars and servants' latrines in residential areas popular all over India, as unexpected visits will invariably demonstrate. Open pans often overflowing with human excreta, frequently containing blood and mucus, will be found hidden from observations by rickety galvanized iron contraptions, but open to millions of flies. Water is seldom, if ever, laid on for cleansing the floors on which the pans lie. If it were, there are seldom, if ever, drains to remove the washings, and any such would invariably be surface drains, with the result that the ground around as well as inside is always fouled with excretal washings. In bazaar areas so-called private latrines in houses are unfortunately also increasing in numbers. These almost invariably are improperly constructed and sited. Owing to poorly paid sweepers (4d. per family per month is a common wage) insufficient in numbers to cope with the work and without satisfactory control, the pans usually contain filth throughout a major proportion of the 24 hours, and being hidden from observation constitute possibly an even greater danger.

The only answer to this problem is the abolition of this open air system, and the deposition of excreta underground by water-borne systems, or where possible in borehole latrines. Fly proofing is being very slowly introduced into Indian troops lines (in which the latrines are of the same pattern) and is in existence in British lines, but the servants' and followers' latrines, the real source of infection remains untouched in this respect. For public latrines in bazaars and servants' latrines in cantonments it is doubtful whether fly proofing the present pattern of latrines would not merely render them fly trap.

Certain hill stations have acquired in the past a poor reputation among families owing to the occurrence of this group of diseases among the children, in particular Ranikhet, Dalhousie and in 1937 Murree also. Here again these conservancy arrangements in the bazaars are considered to be the main sources of infection particularly in Ranikhet and Dalhousie. The above three stations along with Poona, notorious for very many years as one of the main homes for dysentery and fly breeding, head the list among children's infections for 1937.

Until conservancy methods in general improve, we must accept the fact that 1,200—1,500 British or Indian Other Ranks will be admitted annually to hospital suffering from dysentery, that approximately 200 wives of British soldiers and 400 of their children, will also be admitted annually, and of the latter between 25 and 35 will die each year. Reports from Indian family welfare centres show that 444 children of Indian Other Ranks were admitted to centres as in-patients suffering from dysentery, diarrhoea or enteritis. There were 11,191 women and children treated as out-patients for the same group of diseases, and of these 750 women and 1,189 children suffering definitely from dysentery were treated in their quarters (probably an under-estimate). All such are of course potential sources of infection. The monthly reports on Indian towns in general on mortality rates issued by the Public Health Commissioner indicate the high mortality from dysentery, diarrhoea and fever among the civil population.

It is feared that for many years there is little hope of remedying this condition of affairs.

It is the duty of every health officer whether civil or military to constantly bring these facts to the notice of administrative authority, but sympathy must be expressed for the authorities, civil or cantonment, faced with often large populations inadequately housed, inadequately lighted, with insufficient water for cleansing purposes, with little or no surface drainage, with latrine arrangements as described above, and frequently an undeveloped or non-existent (in practice) system of refuse and excretal disposal. The legacy of indifference or ignorance in the past falls heavily on the present generation among whom there is a genuine desire to improve matters, and unfortunately an equally genuine lack of funds. The great majority of the communities concerned in this question are very poor, and without means to finance expensive improvement schemes.

The various diagnostic headings into which the dysentery cases fall annually indicate very clearly that a common standard of diagnostic procedure is generally in vogue in all Commands.

For several consecutive years the percentage of protozoal cases for all-India has varied only in decimal points. Similarly among the bacillary cases the variation between 1936 and 1937 is only 0·4%.

TABLE 15.

	1935.		1936.		1937.	
	Ad-missions.	Per-centage.	Ad-missions.	Per-centage.	Ad-missions.	Per-centage.
Dysentery protozoal	158	10·3	138	10·8	126	10·4
Dysentery bacillary (bacteriologically proved)	637	41·5	592	46·1	596	49·3
Dysentery bacillary exudate (typical exudate, but no organism isolated)	353	23·0	288	22·4	237	19·6
Dysentery clinical	388	25·3	265	20·7	250	20·7

The distribution of the various groups by Commands shows equally little variation from year to year.

TABLE 16.

Dysentery—Admission ratio per 1,000.

Command.	Bacillary.		Bacillary exudate.		Protozoal		Clinical.		Total.	
	1936.	1937.	1936.	1937.	1936.	1937.	1936.	1937.	1936.	1937.
Northern	6.9	8.6	4.0	3.4	1.8	1.9	8.1	7.2	20.9	21.0
Western	12.5	11.2	5.0	6.7	2.5	1.5	15.3	8.5	35.3	27.9
Eastern	13.8	15.8	6.5	4.2	3.3	3.6	4.0	5.5	27.7	29.0
Southern	14.0	13.5	6.3	7.0	2.3	2.8	0.8	2.3	23.4	18.5

Venereal Diseases.

9. There has been an increase of 6.9 per 1,000 in admissions for venereal disease over last year. There was a marked increase in all Commands except Southern.

In Northern Command the majority of cases occurred in Lahore District where there were 115.8 per 1,000 in Dagshai, 78.6 per 1,000 in Lahore and 87.2 per 1,000 in Ambala; in the last station the high incidence was chiefly due to a battalion which had recently arrived heavily infected from Hong Kong.

In Eastern Command the ratio was 188.6 per 1,000 in Calcutta and 135.7 per 1,000 in Barrackpore. In the former station a regiment arrived at the end of 1936 from Lucknow and at the latter another regiment arrived at the same time from Landikotal. In both these new arrivals the temptations of Calcutta were too strong and warnings regarding the dangers of infection were disregarded. Strenuous measures were taken and by the middle of the year the incidence of venereal disease in both stations was greatly reduced.

From table 17 on page 21 it will be observed that Southern Command is the only one which shows any decrease in venereal disease in the last ten years. In other Commands a gradual decline towards the middle of the decade has been followed by another rise. In the total figures for all India, gonorrhœa and soft chancre have slightly decreased but the incidence of syphilis is higher this year than it has been since 1929 with the one exception of 1931. The only conclusion which can be drawn regarding this disappointing state of affairs is that early treatment rooms are not being used sufficiently often or are used too late or after infection is known to have occurred. These rooms are available for all troops and are well equipped. Quite apart from the serious effect on the patient of delayed treatment there is the danger of infection of comrades.

The question of early diagnosis of syphilis cases is fully discussed in the section on pathology.

The average number of days in hospital for gonorrhœa was 48.45 and the percentage of relapse cases was 24.4.

In addition to the routine treatment of gonorrhœa by lavage with pot. permanganate, treatment has been carried out with polyvalent exotoxin vaccine received from Woolwich.

The reports on this Woolwich exotoxin vaccine were not on the whole favourable and the Specialist in Dermatology, Rawalpindi District, while considering this vaccine the only efficient type at present available was of the opinion that it contained a moderately high percentage of endotoxin.

Treatment of gonorrhœa by the benzene—sulphonamide group of drugs has been fairly extensively used.

Although all specialists in dermatology agree that it is of the greatest value in treatment, opinions vary considerably as to the dosage and type of case with which the best results can be expected.

Effects of heat.

10. In 1937 there were 15 cases (0·3 per 1,000) of heat stroke with 6 deaths and 37 cases (0·8 per 1,000) of heat exhaustion with two deaths. In 1936 there were 13 cases (0·2 per 1,000) of heat stroke with three deaths and 39 cases (0·7 per 1,000) of heat exhaustion with one death.

Heat stroke and heat exhaustion cases responsible for many catastrophies among British troops some years ago have been considerably reduced in number. This group numbered 212 in 1926. In 1937 there were 52. There is less tendency now to shut up troops during the hot hours of the day, and the modern soldier has little interest in alcoholic liquors, as compared with his forebears. Both factors are probably concerned in reducing the incidence of these cases.

Irr stations at which cases occurred were as follows :—

Heat stroke—

Sialkot three, Ferozepore two, Peshawar one, Jullundur one, Campbellpore one, Lahore one, Meerut two, Jhansi two, Benares one, Agra one.

Heat exhaustion—

Rawalpindi six, Peshawar four, Sialkot two, Jullundur three, Nowshera three, Risalpur two, Amritsar two, Landikotal one, Lahore one, Agra one, Allahabad one, Muttra one, Fort Sandeman one, Jubbulpore five, Secunderabad one, Ahmedabad one, Mallapuram one.

The age incidence and service in India of the cases were as follows :—

TABLE 18.

Ages.	19	20	21	22	23	24	25	25 to 30	Over 30
Heat-stroke		1	..	2	4	1	1	2	4
Heat exhaustion	1	2	4	5	7	1	..	10	7
Service in India.									
				Under 6 months.	6-12 months.	1-2 years.	2-5 years.	Over 5 years.	
Heat-stroke				2	6	3	2		2
Heat exhaustion				4	8	6	12		7

Among British troops engaged in the Waziristan Operations there were four cases (0·9 per 1,000) of heat-stroke and 17 (3·7 per 1,000) of heat exhaustion.

In Northern Command the practice was repeated this year during the hot weather of having later reveille, work out of doors, a light lunch and the hot meal at night and was greatly appreciated by the troops.

Dengue and Sandfly fever.

TABLE 19.

11. *Incidence of Dengue and Sandfly fever among British troops from 1933 to 1937.*

		1933	1934	1935	1936	1937
Dengue	{ Admissions . .	644	360	262	244	576
	{ Ratio per 1,000 . .	11.7	6.6	5.0	4.7	12.2
Sandfly	{ Admissions . .	2,252	1,973	1,922	1,758	1,167
	{ Ratio per 1,000 . .	40.9	36.2	36.5	33.8	24.6

Dengue.—There was a very marked increase in the total amount of dengue fever during the year but this was due to an epidemic in Calcutta which started in July and continued up to the end of October. Calcutta being in the Ganges delta and near the coast is subject to periodic epidemics of dengue and the last occurred in 1931.

There were a few sporadic cases in April, May and June but in the middle of July the numbers increased. The epidemic reached its peak in September and subsided by the end of October.

Dengue cases.	July.	August.	September.	October.	Total.
British	22	65	168	67	322
Indian	2	14	49	29	94

About 40% of the British troops in Calcutta were affected and 237 of the British cases occurred in Fort William. Indian troops in Alipore were affected but to a much less extent. Many civilians living in Calcutta were also victims of the epidemic.

The majority of cases conformed to the usual text book description. All cases complained of headache, backache, weakness in the legs and marked pain in the eye-balls on moving the eyes, and pains in the joints. Some cases had severe rheumatoid pain and neuralgia. In 50% of the British cases there was a characteristic eruption consisting of dusky spots on the body followed by a furfuraceous desquamation. In the Indian cases the absence of a rash was a notable feature.

In 60% of cases there was a typical saddle back temperature curve. The rest were either mild cases with no secondary rise of temperature or were men who did not report sick until the stage of remission was reached.

Leucocyte counts showed a leucopenia. Routine urine testing was not done in the earlier cases but later glycosuria was found present in a number of cases. In October, 40 cases had 0.1 to 0.5% of glucose in their urine.

Apart from Calcutta the stations most affected were Madras, Meerut and Bangalore.

Sandfly fever.—The very marked reduction in the incidence of this disease was due largely to the decrease in Northern Command where intensive anti-sandfly measures were carried out during the year. The Assistant Director of Hygiene and Pathology, Northern Command, reports that the greatest reduction occurred at stations where the campaign was most intensive, the exceptionally good results at Landikotal having followed a most conscientious application of active sandfly measures.

Oriental Sore.

12. There were only 12 cases among British troops in 1937 but there were 132 cases among Indian troops. This is a considerable reduction on last year when there was an epidemic in Quetta. This year there were only one British and three Indian cases in Quetta.

Cysticercosis.

13. Four cases occurred among British troops during the year of which two were at Secunderabad and one each at Jhansi and Peshawar. Two of these cases were invalided, and two have been kept under observation.

One of the cases had a previous history of *Tænia saginata* infestation in 1930, presumably an incorrect diagnosis. The three other cases gave no history of previous tape worm infection. The case referred to above was admitted on account of fainting attack which culminated in a fit. On examination three nodules were found in his arms and chest and on removal one was found to be typical.

Another case reported sick with violent twitching in his left arm which increased in severity and passed into a spasm with complete flexion of the arm. The patient was in a great state of fear, suddenly became pale, called out that he could not move his arm and fell unconscious. On X-ray examination several calcified cysts were visible in both arms and legs and especially in the left upper arm where a cluster of over 20 cysticerci were seen as small cigar shaped objects about 0.5 c.m. in length.

Twenty-two cases of epilepsy were invalided to the United Kingdom.

There were 20 admissions for *Tænia solium* infestation and 132 for *Tænia saginata* compared with 17 and 134 respectively the previous year.

Diphtheria.

TABLE 20.

14.	Northern Command.	Western Command.	Eastern Command.	Southern Command.	Total.
British Officers (B.S.)	..	3	2	..	5
British Other Ranks	8	3	6	23	40
B. O. Rs' Wives	..	1	..	2	3
B. O. Rs' Children	15	6	10	20	51

There were no epidemics of any size. In Peshawar 12 cases occurred in the autumn, and 12 were also reported from Waziristan. The greater number of cases were from Southern Command and small out-breaks continued in Poona and Kirkee among the school children. Active immunisation of the children with T. A. F. was continued from 1936. One case of diphtheria unfortunately occurred in an immunised child which somewhat discredited the process in the eyes of parents. There was one death in a child in Belgaum, which was seen

for the first time when strider had developed after a two day history of sore throat. The child died after tracheotomy had been performed, but a laryngeal swab *post portem* was positive to virulent *C. diphtheriæ*. Only two cases occurred among Indian Other Ranks during the year, a striking difference to the annual numbers of cases among British Troops and families.

Anti-diphtheria serum is now stocked only in concentrated form, *e.g.*, 10,000 units in 5 c.c. in lieu of the 4,000 units in 8 c.c. capsules, as previously used. In view of the larger dosage required in modern treatment, and the more severe reactions the unconcentrated serum had generally been reported on as unsatisfactory particularly in children.

The distribution of diphtheria cases by Commands is given in Table 20 on page 24.

Cerebrospinal fever.

15. Only one case occurred among British troops (Ranikhet) during the year. The case recovered. Another case (B. O. R's child) was reported from Cawnpore, but although an undoubted meningitis, it was not caused by the meningococcus.

There were 17 cases among Indian Other Ranks and five among followers. *etc.*, the total being the same as in 1936. Thirteen of these cases died. Twenty-one of the cases were treated with Lister Institute concentrated serum. Group 1 (types one and 111).

Twenty of the cases occurred in Northern Command (Peshawar, Lahore, Rawalpindi, Sialkot, Ambala, Bannu, Razmak and Jullundur), the great majority occurring in autumn and spring (November—May). The cases were sporadic and occurred in different units, with only one exception in which three cases occurred in a training centre at Ambala.

Small-pox.

16. *Half yearly state of Vaccination of British troops and families.*

TABLE 21.

	Percentage protected.	
	On 30th April.	On 31st October.
British Officers	98·99	100·0
British Other Ranks	99·21	99·48
Women and Children	98·82	99·80

There were thirteen cases of small-pox in 1937 compared with eight in 1936. There were seven cases and one death among British other ranks, two cases and no deaths among British officers' wives, two cases and one death among British other ranks wives and two cases and no deaths among British other ranks children. All had been vaccinated, but in two cases repeated vaccination had been unsuccessful. Of the two cases that died the British other rank had been vaccinated in 1936, but the British other rank's wife had been vaccinated only at birth. Five of the cases were in Northern Command and the remainder were all in Eastern Command. Four cases occurred in the first quarter of the year in the British Infantry Regiment at Agra where there was an epidemic among civilians in the cantonment.

Respiratory diseases.

17. The admissions for respiratory diseases were slightly higher than in the previous year, being 24·2 per 1,000 in 1937 compared with 23·2 per 1,000 in 1936.

There were 101 cases of lobar pneumonia with only two deaths as against 132 cases and 14 deaths in 1936. The incidence of lobular pneumonia and pleurisy showed little change, but there were fewer cases of bronchitis.

Tuberculosis.

18. There were 61 admissions for pulmonary tuberculosis and seven for tuberculosis other than pulmonary, compared with 57 and nine respectively in the previous year. One death occurred from pulmonary tuberculosis. The cases were evenly distributed throughout India and there was no particular unit with undue prevalence.

Digestive diseases.

19. There were 4,718 admissions, or 99·4 per 1,000 in 1937 as compared with 5,362, or 103·1 per 1,000 in 1936.

Although there were 154 less cases of tonsillitis, this condition accounts for a large number of hospital admissions every year. This year it is third in the list of principal causes of admission to hospital. There were fewer admissions for diarrhoea and this decrease was coincident with an increase in the number of cases of dysentery.

Injuries of Areolar Tissue and Local Injuries.

20. Cellulitis still retains second place as a cause of admissions to hospital in spite of a reduction of 340 cases or 2·8 per 1,000 since 1936. Boils accounted for 346 admissions, this number being 127 less than in 1936.

An issue of $\frac{1}{2}$ oz. extra salt was again made this year during the hot weather in the ration to troops in plains stations in Northern and Eastern Commands. This issue had been made the previous year as an experimental measure with a view to reducing the amount of boils, prickly heat, etc., but the results had been and still are inconclusive.

The conclusions arrived at in Northern Command were that there were so many factors involved and the statistics for 1937 were so inconclusive that the case in favour of such salt issues was "not proven". Many commanding officers, however, were of the opinion that the extra salt ration had a definite value in increasing the physical fitness of the troops and many of the troops appreciated the extra issue and took the full amount.

In Eastern Command the results were also inconclusive. In Lucknow there was a decrease in prickly heat and minor septic diseases. In Allahabad there was an increase. Boils and prickly heat occurred in greater numbers in Meerut District in 1937 than in 1936.

Local injuries consisted mostly of sprains; abrasions and contusions and such injuries, taken as a whole, accounted for 2,728 admissions or 57·5 per 1,000 and constitute the chief cause of admissions to hospital. There were 18 deaths from local injuries which were 13 less than in 1936.

Mental diseases.

21. There were 118 admissions (2·5 per 1,000) for mental diseases compared with 145 (2·8 per 1,000) in 1936. Of these admissions 51 were invalided to the U. K. together with 22 remaining from the previous year.

Slightly more than a quarter of the admissions were for hysteria, sixty-five per cent. of these cases were returned to duty.

In contra-distinction to last year when the admission rate for mental diseases from soldiers with less than six months service in India was 20 per 1,000, this year it was only 2·7 per 1,000 from this age group. In soldiers with from six to 12 months service in India the admission rate was 2·2 per 1,000 and from those with over one year's service in India it was 2·5 per 1,000.

Women and Children (British Other Ranks).

22. The number of women admitted to hospital was 1,326 or 319·7 per 1,000 of the strength compared with 1,369 or 337·6 per 1,000 in 1936. The principal causes of admission to hospital were :—

Abortion	112	Diarrhoea	49
Malaria	77	Cellulitis	36
Dysentery	59	Appendicitis	35
Tonsillitis	52		

In addition 780 women were admitted to hospital for confinement. Of these one developed puerperal septicæmia and recovered, whereas in the previous year there were three cases and two deaths.

The number of women treated as out-patients was 2,837 or 683·9 per 1,000.

There were 17 deaths (3·10 per 1,000) among women, two more than in the previous year.

There were 2,205 (358·1 per 1,000) children admitted to hospital compared with 2,077 (335·3 per 1,000) in 1936.

The principal causes of admission to hospital were :—

Tonsillitis	348	Cellulitis	72
Dysentery	198	Common cold	72
Diarrhoea	183	Constipation	59
Bronchitis	140	Enteritis	55
Malaria	96	Diphtheria	51
Measles	83		

The number of children treated as out-patients was 4,914 or 798·1 per 1,000 of the strength. This was 224 or 40·7 per 1,000 more than in 1936.

Dysentery, diarrhoea and enteritis, with a total of 436 admissions or 70·8 per 1,000 of the strength, accounted for 20 per cent. of the total admissions to hospital. In 1936 there were 362 admissions or 58·5 per 1,000 for these diseases.

There were 79 deaths among children giving a ratio of 12·83 per 1,000. The principal causes were :—

Enteritis	24	Diarrhoea	4
Pneumonia	9	Convulsions	3
Dysentery	8	Premature birth	3
Inanition	8		

Of the total number of deaths 45 per cent. were due to dysentery, diarrhoea and enteritis.

Hygiene.

TABLE 22.

23. *Summary of work carried out at the Military Food Laboratory, Kasauli, during 1937.*

Source of samples.	Number of samples received.	Number accepted.	Number rejected.	Percentage of rejections.
<i>On tender or for acceptance.</i>				
Direct from overseas	603	465	121	20·1
Indian products	1,692	941	593	35·0
Grains from grains depots	3,347	3,063	75	2·2
Bran from other than controlled mills	834	758	76	9·1
Ghi from Ghi Heating Centre, Agra	5,479	5,479	..	..
Stocks purchased without reference to the Military Food Laboratory	194	168	2	1·1
From R. I. A. S. C. stocks for periodical analysis	1,407	1,362	13	0·9
From units on compliance or for advice	1,082	688	289	26·7
Samples in connection with local price	42	9	10	23·8
Total	15,320*	13,583	1,179	7·7

During the year a record number of samples, approximately 2,000 above the average, were analysed by the laboratory. Reconstruction of the laboratory was carried out and has greatly facilitated the work.

The main causes of rejection of supplies manufactured abroad were for tinned milk on account of inferior tin coating of containers and poor quality of milk and old stock and for tinned jam on account of poor quality of fruit pulp.

* In 558 cases further samples were called for.

Rejections of Indian supplies were chiefly for rice, sugar and ghi. Many samples of Indian rice are highly polished and deficient in P_2O_5 content and therefore do not comply with the R. I. A. S. C. specification. Sugar rejections were mainly for dirt and inferior crystal; notwithstanding the large number of sugar manufacturers in India the Defence Forces are practically limited to one supply. Rejections for ghi were for samples received from ghi markets before purchase. Rum manufactured in India, except in the case of one or two firms, is a crude spirit unfit for issue to troops.

Storage tests with ascorbic acid tablets were continued during the year and they showed no appreciable loss of their original ascorbic acid content. Further tests are to be made next year.

Tests carried out with succinylchloramide tablets, for purification of small quantities of drinking water for individual use, proved successful and the tablets were considered suitable for the purpose but owing to the existing financial situation it has not yet been possible to introduce this method of water purification.

The supply of tinned bacon has again proved unsatisfactory and a reliable brand with the necessary keeping qualities for the Indian climate has not yet been obtainable.

The supply of ghi for Indian troops has been improved and the Agricultural Marketing Board of India has now laid down the following grades:—

1. Cow ghi.
2. Buffalo ghi.
3. Mixed cow and buffalo ghi:—
 - (a) special quality.
 - (b) general quality.

The R. I. A. S. C. specification is equivalent to Grade 3 (a) with an acidity of not more than 0.25 per cent Oleic Acid, equivalent to 9 "points".

Quarters and Barracks.—A sum of Rs. 13,10,000 was provided for improvements to existing and provision of new married quarters for British personnel in all Commands.

Housing for officers is still far from satisfactory in certain stations.

A sum of Rs. 2,63,900 was expended on provision of new and improvements to old dining halls and cook-houses in Northern, Eastern and Southern Commands. There is still much room for improvement in this connection.

Attention was again directed to the necessity for exhaust fans in addition to overhead electric fans to ameliorate the working conditions in British cook-houses in the plains during the hot weather.

Water Supplies.—New piped water supplies and improved water storage systems have been provided at several stations and chlorination by means of automatic chloronomes has been introduced at other stations.

At Kohat complaints were received of chlorine taste in the water and the chloronome was disconnected. These complaints were only made in the

cold weather and never during the hot weather and it is possible that the taste was due to chlorine in combination with algoid substances which were present in the winter and not in the summer.

The water is now chloraminated and since the introduction of ammonia no complaints have been received. Since the installation of a new chloro-nome at Jhansi trouble has been experienced with various parts of the apparatus on account of the high acidity of the water and the introduction of a lime saturator is under consideration.

The danger from the primitive water supply from shallow wells at Fyzabad has been increased by the digging of soakage pits down into the water-bearing stratum. The development of a new water supply with central chlorination is being considered and in the meantime the digging of soakage pits has been stopped.

Alumino ferric has now been authorised for the clarification of water.

Swimming Baths.—The provision of garrison swimming baths for troops has not yet been possible owing to lack of funds. Specifications and designs for a modern type of bath of 90,000 gallons capacity with continuous filtration have however been drawn up, and swimming baths are being provided from private funds at first at Lucknow, Ahmednagar and Ambala and later, it is hoped, at other stations.

Bleaching powder and copper sulphate have now been made an authorized supply for purification of water in swimming baths.

Conservancy.—The provision of water carriage sewage systems and septic tanks has been extended but many Indian contractors are not yet experienced in constructional work of this nature and the greatest care has to be taken to ensure that the laying of drains is properly done. In one case a new drainage system was found completely blocked after one day's use and it was discovered that the wooden plug for the cleaning eye of the disconnecting trap had been placed, not in the cleaning eye, but in the main drain opening into the septic tank.

At Jullundur it was found that the soakage pits for the effluent from septic tanks became blocked after heavy rain owing to subsidence and had to be reconstructed. To obviate this, brick-lined shafts 20 feet in depth were constructed with a filter of broken brick or rubble in the upper few feet. These have proved satisfactory but the danger of contaminating the subsoil water has to be borne in mind.

The installation of a water borne sewage system is nearing completion in the reconstruction of Quetta.

A great deal has been done for improvement and fly-proofing of latrines for British and Indian troops but latrines for private servants in bungalows and civilians in cantonments still remain open to flies and often unemptied for hours.

Joint Sanitary Boards.—In many stations where other elements of the population besides military are closely associated joint sanitary boards composed of military, civilian, railways and other representatives have been set up to establish close liaison on anti-malarial work and general sanitary matters. They have proved of great value and mutual benefit to all concerned.

Rat campaign.—These have been organised in all stations in Southern Command with considerable success. The methods employed have been mainly baiting, trapping and gassing of burrows with cyanogas gun. In Mhow satisfactory results were obtained with tangel foot spread on tin plates and as many as six rats were caught at one time.

Ice Factories.—In many stations these are not satisfactory. Those that tender for contracts for supply of ice to troops are inspected and some carry out sanitary recommendations. Others however do not and therefore cannot be considered for contracts, with the result that fewer tenders are received and prices are raised.

If the cold storage scheme for India had materialised much of the difficulty in obtaining good supplies of ice would have been eliminated. The abandonment of this scheme has been a great blow to hopes for betterment of supplies to troops.

Mineral Water Factories.—Efforts have been made to introduce crown cork bottles in place of the old insanitary bottles containing marble stoppers. With many bottling machines the crown cork cannot be used at all or has to be put in position by hand and therefore introduces an element of possible contamination.

Dairies.—Government Military Dairies exist in most of the large stations and their supplies are of high quality.

In some other stations units run their own regimental dairies and these are usually very good.

However good the dairies are, there is always the danger of adulteration and contamination during delivery either by the delivery men or by servants.

On investigation of six deaths from dysentery among children in one station, it was found that gross adulteration of the milk had taken place during delivery and it was necessary to detail a military policeman to accompany delivery men on their rounds.

The danger of allowing servants to take over dairy supplies has been pointed out to families and they have been advised to keep milk, butter and cream in the original containers until consumed and to destroy all cartons, butter papers, bottle caps, etc., to prevent them falling into the hands of unscrupulous persons to whom they are a fruitful source of fraud.

Hygiene inspections.—Hygiene officers were asked to submit with their annual hygiene reports a list of inspections carried out by them during the year. From these it is evident that routine inspections of stations are carried out approximately every six months and in addition many stations have been visited more often in connection with special investigations.

This entails a considerable amount of travelling on the part of hygiene officers some of whom have to cover areas as large or larger than Great Britain.

Field Hygiene and Sanitation.—The unsavoury name of "Sanitary Section" has been changed to "Field Hygiene Section" to more clearly denote the function of these units and to make the designation of such units in India conform to the War Office designation.

Further details regarding hygiene and sanitation in the field are given in the Section on Waziristan Operations.

Pathology.

24. The routine work maintained the usual annual increase during 1937. A total of 201,705 specimens were sent for laboratory examination during the year, 16,891 more than in 1936. Parallel with this increase is the larger number of examinations carried out in clinical side rooms of hospitals annually in connection with malaria and dysentery cases and chemical examinations. The latter in particular would be greater and remove some of the burden on laboratories, if the equipment was more in accordance with modern necessities. A revised scale of this equipment has been ready for some considerable time, but owing to the financial stringency prevailing it has not been put forward as yet. The laboratories therefore still carry out many tests, which should actually be carried out in hospitals.

Enteric group of fevers and Salmonella infections.—Repeated widal tests were carried out on the "bacteriologically undiagnosed" so called enteric group cases. Of 25 such British cases, two were presumably typhoid, two para-typhoid A, two paratyphoid B and in five there was a general rise of T. A. B. sufficient to indicate infection by one of the group. In ten cases there was no serological evidence of either enteric or typhus infection. Two of these were probably mild typhus infections with feeble response in Proteus "O" agglutinins, and slight anamnestic reaction with T. A. B. Repeated blood cultures, stool and urine examinations in all cases had given constantly negative results. Among the Indian cases five were probably typhoid, five paratyphoid A, two paratyphoid B, and in four there was a sufficient general rise to indicate a group infection. Two cases were probably mild typhus. Eleven cases gave no serological evidence whatever of enteric group infection. Like the British cases all bacteriological examinations were negative. The great majority of the cases were mild with little or nothing beyond pyrexia, relatively slow pulse, slight headache, constipation and occasional bronchitic signs, i.e., identical with so many of the mild enteric fevers in the inoculated, and the mild typhus. In 8 of the British cases the temperature was raised for only 10 days or under, but this is of little significance as two British and eight of the Indian paratyphoid cases and three Indian typhoid cases had similar short periods of pyrexia. Of 29 typhoid cases among Indian troops 65 per cent. had what would be considered definite diagnostic rises in T. O. agglutinins, the Felix method giving almost invariably much higher readings than the Dreyer method. Of 14 paratyphoid A, in only 42 per cent. could the "O" response be considered definite. While allowing for the failure in serological diagnosis among a percent of repeatedly inoculated individuals, a difficulty which does not seem always to be realised in all teaching circles in the United Kingdom and elsewhere, owing to lack of practical experience with sufficient numbers of such cases, it seems certain that a number of the enteric group cases are not in actual fact infections with enteric group bacilli, or indeed bacillary infections at all. A research carried out as to whether many of the cases are not in actual fact virus infections of an unknown nature might produce some very interesting results. It is possible also that further experience in the use of Vi strains of typhoid bacilli may in part assist towards a solution of the difficulty in connection with typhoid infections. As regards the comparative trials between Dreyer's technique and Felix technique; the latter modified in so far that dead T. O. suspensions similar to those issued from the Enteric Laboratory for the Proteus group were used and the dropping technique of Dreyer employed a mass of detail has been collected, which it is impossible to include in an annual report. These trials

in brief have justified the great amount of extra labour thrown on laboratory staffs during the year in that, with only one exception, every laboratory has found that much higher titres of agglutination are found with the Felix technique and that by employing this technique there will be more chance at least of a diagnosis which can be relied upon even in an individual repeatedly inoculated previously. On the other hand failure in response to agglutination in an undoubted typhoid infection did occur even by this method as also did curious discrepancies in the same case. In most cases therefore a rising titre of agglutination will still remain the main diagnostic standard although possibly further experience may prove that in a percentage of cases one standard could be accepted. If so it is thought it will have to be high and probably in the region of 1/1000 at least. Also, as the result of these tests, it has been decided to cease "H" agglutination altogether unless especially asked for and continue with only T. O. & A. O. suspensions, and the Proteus "O" group (OXK, OX19, OX2). With the latter, although again Felix technique gave higher titres, in the great majority of cases Dreyers technique proved very reliable.

The decision for abolishing "H" agglutination is based on the facts that now "O" agglutination is universally employed, the numbers of tests on each case have become too great for laboratories to cope with, that "O" agglutination with Felix method gives at least equal and probably a better indication of an enteric fever infection, and is an improvement in that anamnestic reactions occur with much less frequency than with "H" agglutination, although it needs to be realised that they do occur occasionally.

It has been interesting to observe the results of the various methods of agglutination on an unusually large number of cases among civilians, servants, etc., who were uninoculated, and suffered from enteric fever infections. In every case response both to "H" agglutination, and to "O" agglutination by Dreyers and Felix method was absolutely diagnostic, and from the "H" agglutination results there was no doubt as to the variety of the infecting bacillus, an entirely opposite picture to that found in such a large percentage of the inoculated cases.

Blood cultures during the year numbered 4,267. *B. typhosus* was isolated on 93 occasions, and *B. paratyphosus* A in 30, first isolation in both cases averaging out on the 5th day after onset of disease. Of the total cultures 14 per cent. were to be contaminated, a great reduction compared with the results of a few years ago. That further improvement is possible is evident by the fact that in certain laboratories as low a figure as 5 per cent. contaminations occurred. From the majority of the laboratories bile salt media is now issued to hospitals in McCartney's bottles with perforated screw cap and rubber disc and viskap cover. These have been found to give a lower percentage of contaminations than in the case of such bottles with unperforated screw caps, as leakage during transit to the laboratory from the hospital was found to occur with the latter owing to imperfect care in rescrowing the cap after the addition of blood. Injection of adrenalin prior to the taking of blood cultures has been carried out in several hospitals during the year, and several D. A. Ds. P. comment in their annual reports on the greater number of positive results since employing this addition to their technique. The isolations of enteric group bacilli from faeces were 54 (*B. typhosus* 37, *B. paratyphosus* A 14, *B. paratyphosus* B. 3), surprisingly few considering the number of examinations (8,724). Apart from any question of defective technique in

the collection of specimens in hospitals for despatch to laboratories, it is probable that in a heavily inoculated individual isolations may be more difficult than in the case of an uninoculated individual. The numbers of isolations per annum from cases admitted to the Enteric Convalescent depot has also greatly decreased during the past few years, and in 1937 no carriers were discovered among this group. It seems therefore possible also that the more potent the T. A. B. vaccine is the less chance there is of the patient becoming a carrier after infection. There is little doubt also that in inoculated individuals examinations of faeces should commence as soon as possible. In a few cases enteric group bacilli were isolated as early as the 2nd or 3rd day after admission to hospital. This is particularly important in view of the number of enteric infections of short duration, *e.g.*, 6-10 days pyrexia, which occur annually, *B. typhosus* was also isolated from urine of cases on 31 occasions.

Among the 238 cultures sent to the Enteric Laboratory for confirmation or identification during the year the following were classified :—

<i>Bact. typhosum</i>	.	.	.	.	.	.	.	.	.	138
<i>Bact. paratyphosum A</i>	.	.	.	.	.	.	.	.	.	42
<i>Bact. paratyphosum B</i>	.	.	.	.	.	.	.	.	.	4
<i>Bact. enteritidis</i>	.	.	.	.	.	.	.	.	.	2
<i>Bact. enteritidis var dublin</i>	.	.	.	.	.	.	.	.	.	5
<i>Bact. aertrycke</i>	.	.	.	.	.	.	.	.	.	1
<i>Bact. bareilly</i>	.	.	.	.	.	.	.	.	.	2
<i>Bact. reading</i>	.	.	.	.	.	.	.	.	.	1
<i>Bact. stanley</i>	.	.	.	.	.	.	.	.	.	1

Salmonella dublin was isolated in Quetta from a child who died of meningitis. The organism was isolated on three occasions from the cerebrospinal fluid and from the spleen postmortem. Blood and faeces cultures were negative.

Bact. bareilly was originally isolated in Bareilly in 1928, and has not been isolated again in India until this year, although it has been found in places as widely separated as the island of Puerto Rico and the London suburb of Hornsey. The isolations in 1937 were by Command Laboratory in Poona. Three cases of food poisoning occurred in an officers rest camp in Poona. All complained of fever, diarrhoea, nausea and vomiting. The organism was isolated from only one of the patients who gave a positive agglutination against *B. bareilly* of 1/2500. One month after their illness two of the other victims gave titres of 1/250 and 1/50. Three months later the organism was again isolated from a patient suffering from dysentery with a three day pyrexia. His homologous agglutination was 1/125, and against the stock culture from Kasauli of 1/250. In the former cases the small outbreak was attributed to Canadian tinned salmon, but no bacteriological proof of this was obtained.

Bact. stanley was isolated in Murree from the stool of a child suffering from gastro-enteritis. This is of interest as the organism has not previously been reported as occurring in India.

Bact. aertrycke was isolated from the blood, stools and urine of a case suffering from a clinically typical typhoid fever on several occasions. The case was fatal, and *Bact. aertrycke* was again isolated postmortem from the spleen.

There is no doubt that an investigation of salmonella infections among the civil population would yield surprising results but means for such are not available at present.

A somewhat rare finding from a fatal case of fever was *B. pyocyaneus* which was recovered in Mhow from the blood during life, and in pure culture from lungs, spleen and intestines postmortem. Infection occurred in a wound on the thumb originally—areas of haemorrhage and infarctions were present in the lungs, and general hyperaemia of the intestines was present.

The usual crop of so called *B. faecalis alkaligenes* isolated from the blood of patients suffering from typhus and typhus like and enteric group fevers occurred during the year. Owing to the confusion existing in the past all such were ordered to be forwarded for identification to the Enteric Laboratory, Kasauli. It seems that there are two main types (a) a slender motile organism described by Petruschky as *B. faecalis alkaligenes*, which is really the vibrio alkaligenes of Lehman and Neumann and (b) a non motile thick gram negative type which should be called the *B. alkaligenes*.

It is this latter type that is so frequently isolated from the typhus like and the enteric group of fevers, and it is doubtful whether it is in any way responsible for the symptoms. The statement that this bacillus could be responsible for continued fever originated from work carried out over 20 years ago, when blood cultures were not carried out with any thing like the same regularity as at present, and seldom if ever in cases of typhus fever. The statement seems to have been copied from text book to text book without further investigation. Major H. J. Bensted, R. A. M. C. points out the danger of accepting it without further proof, and states that he isolated it on many occasions from the blood of patients suffering from continuous fevers in the Black Sea area in 1920. These fevers were very like the mild cases of typhus fever seen in India to-day and, although the severe form of European typhus (X19) was rampant in the area, Weil Felix reactions were not carried out, because it was thought that the infecting organism had been recovered from the blood of the patient.

Investigations still continue on this subject.

Dysentery.—Specimens from 4,138 cases of dysentery and 3,263 cases of diarrhoea were bacteriologically examined during 1937; 15,930 bacteriological examinations were carried out in connection with these cases, 2,176 more than in 1936. There were 253 cases of amoebic dysentery and 14 cases of mixed bacillary and amoebic infection. Typical bacillary exudates were present microscopically in 78 per cent. of the cases.

As usual results varied to some extent in the various laboratories, but on the whole there has been a distinct all round improvement over previous years.

In Eastern Command positive results whether to bacterial or amoebic infections averaged 69·9 per cent. In Northern Command the average percentage of isolations from typical exudates of bacillary dysentery was 71·7 per cent., a high standard where ten laboratories are concerned. The

corresponding average percentage from the indefinite exudates was 40.1 per cent. In Southern Command laboratory positive results from a series of 55 diarrhoea cases (no blood or mucus) were surprisingly high (83.6 per cent.). In almost all these cases *B. sonne* was the infecting organism:

As in previous years figures from outstations were poorer than those in which a laboratory is located. Lack of organization among the subordinate hospital staffs in details of collection of specimens, being the main cause. In this connection in Jhelum and Wellington, as an experiment, a small amount of laboratory equipment (incubator, steamer, autoclave, petri dishes, etc.), was allotted to the clinical side room of the military hospital and an assistant surgeon trained in laboratory work placed in charge. Media was supplied from the district laboratory in McCartney's bottles. Owing to the troops leaving Jhelum soon after for Waziristan no results were obtained, but in Wellington dysentery bacilli were isolated from 56.6 per cent. of the cases in the station. In the previous year there were no positive results. This experiment is being continued during 1938. For many years the tendency of the glycerine and saline solution to become acid on standing has been stressed and various measures have been taken to overcome this. Major A. Sachs, R.A.M.C., experimented during the year with buffered glycerine and saline solutions. He has found that a neutral solution prepared in his laboratory changed to acid in 24 hours after fractional sterilization, and that all specimens received from the hospitals in his district were acid on arrival in the laboratory.

His experiments proved that a stable solution could be prepared by adding one per cent. disodium monohydrogen phosphate to the glycerine and saline solution using phenol red as indicator. Solutions prepared in this manner and stored in 1 oz. screw cap bottles retained their reaction for over nine months after sterilization by steaming for 1/2 hour on three days. It is recommended that all laboratories should issue to hospitals screw cap bottles containing 10 c.c. of this solution into which specimens of mucus should be placed as early as possible after passage. In one instance isolations from cases in a certain institution increased from almost nothing to 86 per cent., once this solution was employed.

In all other details there has been no change in any detail of technique during the year.

The various strains isolated are similar to those obtained in previous year.

One strain of the Newcastle bacillus was isolated in the District Laboratory, Meerut. Several cultures bearing a superficial resemblance to this strain were forwarded to the Enteric Laboratory but when subjected to absorption tests, were not established as true members of the type. Isolations of Andrewes types of *B. flexner* increased by 175 over 1936, and again the W. type was the commonest in this group. The Boyd strains also increased by 89, and total on the average 17 per cent. of positive isolations per annum. These strains have definitely established themselves, now over a series of years, but appear to be unrecognised in civil medical circles in India. Presumably this is due to the fact that absorption tests or issues of specific type sera are necessary for their identification. In Southern Command bacteriophage issued by an institute in India was largely used in treatment in addition to the usual saline and serum treatment, apparently with some success. Tests carried out in the Command Laboratory, Poona showed however that this

phage while active against Andrewes types of *B. flexner* in broth culture, had no effect either on the Boyd strains or *B. sonne*, which when taken together account for a greater percentage of cases on the average than the former.

Work has been carried out during the year at the Enteric Laboratory, Kasauli on the preparation of pure type specific agglutinating dysentery sera and small quantities have been in use in that laboratory. It is hoped that certain technical difficulties connected with the production of large quantities of the sera for issue to other military laboratories will eventually be overcome, thus avoiding the many absorption tests now required for confirmation of the various strains.

The distribution of the various strains of dysentery bacilli throughout the four commands during 1937 is shown by laboratories in table 23 and the percentages of each group in each command in table 24.

In the latter table it will be noted that there is little difference between Commands in the percentages of the various infections to the total in the command. Western Command has a higher percentage of *B. sonne* infections than in the other three commands, but this may be due to the fewer cases occurring annually owing to the smaller strength of troops in this command.

These figures represent careful work in 26 laboratories in different parts of India with confirmation by absorption tests when necessary in a central laboratory in each command. They have been very consistent now over a period of years. As the military population is merely an index of what is occurring unrecognised among the civil population in contact with them, it is considered that this table must represent fairly accurately the various type of dysentery and their respective proportions among the civil population also.

Unfortunately no accurate information is available from civil sources with which it can be compared.

From the Indian servants examined prior to their being engaged for duties entailing the handling of food *B. flexner* was isolated on 29, and *B. shiga* on four occasions. A Boyd's strain sub-group B. was only isolated once from this group of persons.

The following Boyd strains were received in the Enteric Laboratory and two other laboratories during the year 103 B, (1), 119 (9), 170 (1). P. 274 (22) of which 20 were from Northern Command, P. 143 (2), 1063/F. A. 5, D. 1 (7). Southern Command Laboratory, Poona records 103 (3), 170 (15), 88 (7) 288 (1) 274 (7) D. 19 (1). District Laboratory, Quetta, 170 (9) 119 (1), 103 (1), 88 (6) 288 (1) 274 (1) D. 1 (1).

Apart from the occurrence of mixed protozoal and bacillary infections, mixed infections with various strains of dysentery bacilli occasionally occur, e.g., in Command Laboratory Poona five such cases were discovered.

B. flexner Y and *B. sonne*, *B. flexner* D. 19, and *B. sonne*, *B. flexner* 170 and *B. schmitz*, *B. shiga* and *B. flexner* W, *B. shiga* and *B. sonne*.

The numbers of such cases are possibly greater than generally thought, as they are unlikely to be searched for in ordinary routine examination.

Diphtheria.—Throat swabs from 4,219 cases were examined in the Laboratories in 1937 of which 177 were positive to *C. diphtheriae* (4.1 per cent.). In all 5,723 bacteriological examinations were made, 611 or 10.6 per cent. being found positive. The total contacts examined were 1,854 of which 2.3 per cent. were found to be carriers.

TABLE 23.

Analysis of types of dysentery bacilli isolated and total E. histolytica cases in 1937.

Commands and laboratories.	Group A 1		Group A 2		Group B		Group C		B. Shiga.		B. Schmitz.		Entamoeba histolytica.		Total.
	B. flexner strains V. W. X. Z. Y. etc.	Andrews strains V. W. X. Z. Y. etc.	Boyd's strains 103, 170, 119.	Boyd's strains 88, 288, P. 274, D 1 and D 19.	Boyd's strains 88, 288, P. 274, D 1 and D 19.	B. sonne.	B. sonne.	B. sonne.	B. sonne.	B. sonne.	B. sonne.	B. sonne.	B. sonne.		
Northern.															
Kasauli	5	1	8	17	17	17	17	17	17	17	17	17	17	17	34
Peshawar	41	28	29	18	18	18	18	18	18	18	18	18	18	18	148
Kohat	27	6	11	6	6	6	6	6	6	6	6	6	6	6	66
Razmak	131	37	34	27	27	27	27	27	27	27	27	27	27	27	269
Rawalpindi	49	16	22	26	26	26	26	26	26	26	26	26	26	26	143
Lahore	40	1	2	9	9	9	9	9	9	9	9	9	9	9	95
Bannu	80	6	7	5	5	5	5	5	5	5	5	5	5	5	160
Sialkot	12	1	..	12	12	12	12	12	12	12	12	12	12	12	28
Ambala	37	1	4	7	7	7	7	7	7	7	7	7	7	7	66
Abbottabad	18	2	..	2	2	2	2	2	2	2	2	2	2	2	31
Total	440	99	117	129	129	129	129	129	129	129	129	129	129	129	1,030
Southern.															
Poona	92	18	16	69	69	69	69	69	69	69	69	69	69	69	253
Colaba	13	..	4	4	4	4	4	4	4	4	4	4	4	4	27
Bangalore	46	4	7	18	18	18	18	18	18	18	18	18	18	18	116
Trimulgherry	65	28	14	44	44	44	44	44	44	44	44	44	44	44	198
Jubbulpore	33	1	3	6	6	6	6	6	6	6	6	6	6	6	75
Mhow	11	..	..	3	3	3	3	3	3	3	3	3	3	3	27
Nasirabad	13	..	..	3	3	3	3	3	3	3	3	3	3	3	27
Total	273	51	44	150	150	150	150	150	150	150	150	150	150	150	723

Western.

Quetta	.	.	.	.	23	11	8	34	5	1	2	84
Karachi	.	.	.	.	31	..	2	19	..	—	10	62
Total	.	.	.	.	54	11	10	53	5	1	12	146

Eastern.

Meerut	.	.	.	.	43	31	16	18	14	11	7	140
Lucknow	.	.	.	.	66	27	26	26	18	17	3	183
Calcutta	.	.	.	.	23	4	6	23	6	1	20	83
Bareilly	.	.	.	.	14	7	4	10	..	6	3	44
Dehra Dun	.	.	.	.	16	..	4	16	4	8	8	55
Jhansi	.	.	.	.	40	3	11	26	10	15	16	120
Allahabad	.	.	.	.	21	1	—	10	5	2	9	48
Total	.	.	.	.	222	73	67	128	57	60	66	673
Total All-India	.	.	.	.	989	234	238	460	246	163	242	2,572
	.	.	.	.	814	177	206	337	261	131	212	2,138

TABLE 24.

Percentage of types of dysentery bacilli isolated in the commands during 1937 and percentage of positive results to *E. histolytica*.

Command.	Total.	Group A 1		Group A 2		Group B		Group C		B. Shiga.	B. Schmitz.	Positive Entamoeba histolytica.
		B. flexner strains V, W, X, Z, Y, etc.	Andrews	Boyd's strains 103, 170, 119.	Boyd's strains 88, 288, P. 274 D 1 and D. 19	Boyd's strains 88, 288, P. 274 D 1 and D. 19	Boyd's strains 88, 288, P. 274 D 1 and D. 19	B. sonne.	B. sonne.			
Northern	1,030	42.7		9.6	11.1	12.5		10.9		4.5		8.2
Southern	723	37.7		7.0	6.0	20.7		9.8		7.6		10.9
Eastern	673	32.9		10.8	9.9	19.0		8.4		8.9		9.8
Western	146	36.9		7.5	6.8	36.3		3.4		0.6		8.2
Average All-India		37.5		8.7	8.4	22.1		8.1		5.4		9.2

The larger number of positive cases occurred in Southern Command (74), Northern Command (47), Eastern Command (42), Western Command (14).

3.9 per cent. contacts were positive in Eastern, 3.3 in Western, 1.7 in Northern and 0.88 per cent. in Southern Command.

Nasal swabs from 176 suspects were bacteriologically examined. This aid to diagnosis was employed only in the case of a few laboratories particularly in Command laboratory, Poona. Of 102 cases 10 or 9.8 per cent. were found positive. In District Laboratory, Lahore, four or 18 per cent. of 22 cases were positive, and in District Laboratory, Rawalpindi, 5.5 per cent. were positive out of 18 cases. In view of these results it is considered that in suspicious cases the nasal swab in addition to the throat swab should be employed more extensively. In the case of contacts the results of nasal swabbing were definitely poor, positives only being obtained in two out of a total of 363 cases. During the year adverse comment was received from certain hospitals as regards non-virulent *C. diphtheriae* being reported suspiciously often from cases which clinically were considered to be definite diphtheria. In the majority of these cases the reports from the laboratory were on the results of intradermal tests. As the result of this instructions were issued that tests should as far as possible be carried out by injection and post-mortem examination of guinea pigs rather than by use of the intradermal test, and that the latter procedure must invariably be carried out after intradermal tests had reported a non-virulent organism from a clinically typical case. Instructions were also issued that if a case was considered to be clinically typical, the official diagnosis must be clinical diphtheria in spite of negative laboratory reports. There has been possibly a tendency in recent years to allow the diagnosis of diphtheria to be too much based on laboratory findings, important as these are.

Bearing on the above the following details are of interest :—

In Ferozepore in the autumn two children of different families, but belonging to the same unit contracted diphtheria. Three children contacts of a different family to the above, but in the same unit, were found to be also positive. Child (A) from whose throat virulent *C. diphtheriae* was isolated, had cutaneous sores on legs and hands (six weeks duration) from which virulent *C. diphtheriae* were also isolated. Child (B) sores on fingers and mouth for 10 days; virulent *C. diphtheriae* isolated from throat and cutaneous sores. Child (C) exactly similar sores on mouth and fingers present from which non-virulent *C. diphtheriae* were isolated, and confirmed repeatedly as non-virulent by animal tests. No *C. diphtheriae* were discovered in the throat of this latter child.

All three children were treated with daily doses of 2000 units antidiphtheritic serum and the sores in all three cases commenced healing immediately.

According to regulations in force throat swabs from almost all inflammatory conditions of the throat are taken as a routine for bacteriological examination. Unless *C. diphtheriae* is isolated the bacteriological results obtained are possibly not sufficiently recorded. Tonsillitis is a common cause of admission to hospital. In 1937 there were 1,362 admissions B. O. Rs. and 583 I. O. Rs. and the numbers of pharyngitis admissions annually are always high.

Of 2,127 such cases, Vincents spirillum was found in 120, of which 45 occurred in Razmak out of the 50 positives recorded in Northern Command laboratories. There were 35 positives from Eastern Command, but in Southern Command positives were only found in 25 of the 1,092 cases examined. Streptococci were reported in 148 cases of which only 15 are mentioned as being hæmolytic strains. In view of the large number of throat infections annually it would seem that more careful records should be kept in all military laboratories particularly as regards the findings or otherwise of hæmolytic streptococci. It is known that streptococcal throat infections, which can be very severe are common among both civil and military in India, but as yet no classification has been made of this group of organisms on modern lines.

Cerebrospinal Fever.—Of the 23 cases investigated during 1937, positive cultures of meningococci were obtained from only 11. As with the exception of one case all occurred in stations in which laboratories are situated, these results might with advantage be improved upon. The cases being sporadic and few in number in stations it is probable that pea flour trypsin agar medium was not always available when required. Of the 12 positive cultures nine were typical, eight were type 1, and one type 2. The isolation of salmonella type dublin from the cerebrospinal fluid, of a case thought to be meningococcal in origin has already been referred to.

In all 192 cultures from cerebrospinal fluid of cases of varying nature, including the above, were made during the year, the great majority of which were from Northern Command laboratories (109). Cell counts totalled 207, microscopic examinations of deposits 172, Langes gold chloride tests 67, chemical examinations e.g. globulin, chlorides, etc. 333. 172 Wassermann tests were made on cerebrospinal fever in Poona, Rawalpindi, Quetta and Meerut.

Routine examination of menials prior to employment.—Positive results considering the large number of individuals bacteriologically examined are not encouraging, due to difficulties in connection with the collection of samples for bacteriological examination, and probably also intermittency in time as regards the numbers of bacilli passed by such persons. There were discovered however two carriers of bact. typhosum, six carriers of bact. paratyphosum A, 28 B. flexner, five B. shiga, seven B. sonne, and three B. schmitz. A certain number of cases of both enteric fevers and dysentery have at least been prevented by these very laborious examinations. In addition to the above, Bact. typhosum was recovered in district laboratory Lahore by chance from two Other Ranks suffering from diarrhoea, who were classed as carriers.

For some few years the rejection of menials for employment on grounds that they were passing cysts of *E. histolytica* has been dropped and microscopic examinations for this purpose have as a result not been pressed for from laboratories. Although such a procedure was viewed by some with misgiving, it must be admitted that no increase in amoebic dysentery has occurred as a result. It is interesting however that in Northern and Eastern Commands 90 menials were found to be harbouring these cysts in 1937 and the number would have undoubtedly been greater had the regulations in force demanded careful examinations in this respect. Other Protozoa recorded were 392 *Giardia intestinalis*, *Iodamoeba butschlii* 137, *E. nana* 19, vegetative *E. histolytica* four and *Balantidium coli* one. It is considered that apart from regulations

examinations for protozoal cysts, etc., should be carried out, as it is valuable training for subordinate staffs in the laboratories. As the result of the change in regulations with regard to cyst carriers, certain laboratories also neglected the helminthological examinations of these menials. In 1937 no reports were received from five laboratories (three Southern, one Eastern, one Western). Apart from the training of subordinate staff in diagnosis, the danger of cysticercosis infection makes it necessary that all *Tænia* hosts among food handlers, should be treated satisfactorily before being allowed to handle troops' food, and it is considered that for obvious reasons *Ascaris*, and *Ankylostoma* hosts should also be treated. It is to be noted that of the 46 *tæniidæ* found among these Indian servants, 10 were proved definitely to be *T. solium*, the remainder being *T. saginata*.

The following table illustrates the findings in each command as regards the helminth infections among menials.

TABLE 25.

Command.	<i>Tæniidæ</i> .	<i>H. nana</i> .	<i>Ascaris lumbricoides</i> .	<i>Ankylostoma duodenale</i> .	<i>Necator americanus</i> .	<i>Trichuris trichiura</i> .	<i>Enterobius vermicularis</i> .	<i>Strongyloides stercoralis</i> .
Southern . .	3	23	76	67	83	30	24	0
Eastern . .	29	13	102	178	0	2	23	13
Northern . .	12	1	97	554	3	22	29	2
Western . .	2	1	1	17	...	4	1	...
	46	38	276	816	86	58	77	15

Laboratory tests in connection with the diagnosis of syphilis.—The number of Wassermann tests in the four laboratories engaged in this work has increased (16,689 tests) as has the number of Kahn tests (6,871).

The percentage of hæmolysed or septic sera, and broken capsules received in the laboratories remains much the same each year. In Eastern Command however the number of defective sera increased considerably as compared with 1936. It is not sufficiently realised by medical officers in connection with wassermann tests that hæmolysed sera gives false positives and that over-heating destroys weak positives.

The employment of the Kahn as a check on the Wassermann test is found increasingly useful. In Command Laboratory, Poona and in District Laboratory, Meerut it is used on almost all sera received. In District Laboratory, Rawalpindi, it is used as a check only on W. R. positive or doubtful positive sera. In this latter laboratory the antigen was prepared from Bacto-Beef heart which was found to be very satisfactory. In Quetta some false positives occurred with the Kahn test in the extreme cold weather, this was thought to be due to precipitation of cholestrin due to the cold.

Complement for the Wassermann test is now concentrated and frozen in all four laboratories. Titres of 1/40—1/60 are found one month after the initial bleeding. In Meerut during the hot weather some deterioration occurred but insufficient to interfere with the test. Southern Command Laboratory, Poona, prepares and issues many of the various reagents for the W. R. and much time has to be spent in this laboratory on their preparation and titration.

The work done in the four laboratories in 1937 is shown in tables 26 and 27.

TABLE 26.

Wassermann tests and Kahn tests—1937.

Laboratory.	Blood sera.			Wassermann tests.			Total blood sera all sources.	Total wasser-mann tests on blood C. S. F. sera all sources.	Total wasser-mann tests on tests on C. S. F.	Total Kahn tests.	Percentage sera haemolysed and septic.		Percentage capsules broken.	
	British troops.			Indian troops.							Br.	Ind.	Br.	Ind.
	1930	1931	1932	1930	1931	1932								
Southern Command Lab., Poona	1930	1811	1920	1809	4237	4223	31	4222	1.9	2.8	0.5	0.1		
District Lab., Rawalpindi	1946	3894	1959	3904	6014	5992	22	1344	1.0	0.8	0.3	0.4		
District Lab., Meerut	2446	2547	2437	2532	5115	4985	37	1259	1.0	1.0	0.3	0.5		
District Lab., Quetta	538	722	533	705	1515	1489	31	46	0.0	1.6	0.0	0.5		
Total	6860	8964	6849	8950	16881	16889	121	6971						

TABLE 27.

Results of Wassermann tests—1937.

	Poona.		Rawalpindi.		Meerut.		Quetta.	
	Negative.	Positive.	Negative.	Positive.	Negative.	Positive.	Negative.	Positive.
Syphilis primary (before treatment)	53	167	12	122	22	187	6	5
Syphilis secondary (before treatment)	...	23	...	26	...	66	...	12
Syphilis tertiary (before treatment)	...	33	1	19	...	217	...	17
Syphilis (after treatment)	1315	147	1645	609	1736	459	508	60
Congenital	15	...	...	...	...	...	...	...
Venereal sore	1235	...	1318	327	1859	...	361	37
Gonorrhoea	89	...	113	27	31	...	12	...
Non-venereal	1012	67	1481	353	833	7	276	4

With regard to primary syphilis it is considered that the above table discloses an unsatisfactory state of affairs in that 481 cases gave positive Wassermann reactions prior to the commencement of treatment and that 127 cases had actually passed into the secondary stage of syphilis before diagnosis was established. The greater percentage certainly are Indian troops who frequently either endeavour to treat themselves, or receive local treatment in the bazaar, but the numbers of British troops included in the above are also much too high. The difficulty from the laboratory side mainly concerns outstations where dark ground facilities are not available, but similar diagnosis on W. R. are found also in larger stations where every facility for dark ground examinations exist, *e.g.* in B. M. H. Quetta out of eight primary cases among British troops, in only three was diagnosis based on the presence of T. Pallida. In I. M. H., Quetta only seven out of 17 cases were similarly diagnosed. In Poona an examination of the venereal disease cards showed that in 121 cases (1937) W. R. was positive before treatment commenced.

Enquiries were made as to the reliability of darkground apparatus in all military laboratories, and in several cases this was not satisfactory and has since been rectified. Instructions were also issued that capillary tubes and instructions for the taking of serum from sores for transmission to the laboratories were to be forwarded to all military hospitals by the Officer-in-charge of the laboratory concerned. In addition the attention of administrative and executive medical officers has been drawn to the importance of careful attention being given to this most important matter and records are now being kept in the medical directorate as regards the method of diagnosis in every case. Compiled results are being issued to Deputy Directors of Medical Services of Commands quarterly for information of all concerned.

In a controlled population such as the Army primary diagnosis of syphilis on Wassermann reaction particularly among British troops should be a rare occurrence.

This matter has been already referred to in the general section of this report.

Notes on routine laboratory work.—Biochemical work remained with the exception of one or two laboratories engaged on particular investigations such as Allahabad remain much the same as in 1936, *e.g.* blood sugar (281), blood

urea (229), Van den Bergh's (314). Kidney efficiency tests were 272 in number, and quantitative examinations of urinary constituents increased to 1,352, mainly due to researches on effects of heat in Brigade Laboratory, Allahabad. Blood typing was done for 724 individuals and most military laboratories are now prepared to store their own types 2 and 3 sera for this purpose. Blood sedimentation tests increased to 211, but these tests seem still restricted to only a few laboratories in each command and mainly the District laboratories. Similar remarks apply to reticulocyte counts, although these may not have been necessarily recorded in annual reports. Complete hæmograms are not done on cases of anæmia in all laboratories, and particularly with regard to Indian troops much useful work could be done in this connection. Major Puri, I.M.S., as the result of preliminary investigations has expressed the view that anæmia among Indian troops is to a large extent unrecognised at present, and there is indeed little laboratory evidence available on which sound opinion can be given on this point. Tests for occult blood in fæces seem surprisingly high (607) of which 337 were from Northern Command laboratories. In Southern Command, where strengths are similar, only 78 such examinations were made. The majority from Northern Command were from Rawalpindi (120), Peshawar (68), Lahore (47). Seventyone *post mortem* examinations were done by pathologists during the year, the largest number 28 in Northern Command.

Bacteriological analyses of water numbered 2,237. From reports on water supplies received in the Medical Directorate, it does not seem to have been universally understood that no result on drinking water for troops, whether chlorinated or unchlorinated, is considered satisfactory unless there are no fæcal *B. coli* in 100 c. c. of the sample submitted. Similarly reports have been received on supplies stated to be satisfactory in which on enquiry it has been found that only the source of the supply or tank after chlorination was tested. In view of the age of certain distribution systems, often intermittent supplies in hot weather, and the nature of the areas through which many of the pipes pass, samples from tap water at strategic points in a cantonment, as well as samples from the source or chlorination point are very necessary. Chemical analyses were seldom asked for and numbered 338.

Bacteriological tests on milk were comparatively infrequent (199). Chemical analyses were rather more frequent (338). It is considered however that the control of pasteurised milk, when such is supplied by the Government dairies should be carried out at frequent intervals, in the military laboratories using the Lovibond Limitester and the phosphatase test, which is simple, easy to carry out, and looked on with increasing favour by those laboratories who have been using it during the year. There were 900 dark ground examinations for *T. pallida*, but as the total number of positives or negatives from cases eventually diagnosed as syphilis were not recorded by all laboratories, it has not been possible to assess these results. There were also only 205 bacteriological analyses recorded of aerated waters during the year. Possibly some were included under those of drinking water. In view of the sources and surroundings of many of these aerated water plants a careful check is necessary of their products. Few examinations seem to have been carried out in the Northern Command laboratories in this connection.

7,571 bacterial examinations of urine resulted in 41 enteric group bacilli and the somewhat large number of 369 isolations of *B. coli*, considering the healthy population mainly concerned. A surprisingly large number of the latter (115) were from the District Laboratory, Rawalpindi. There were 515 examinations of scraping from tropical sores, Leishman Donovan bodies being found in 207 instances, of which 170 were in District Laboratory, Quetta.

This is an indication of the unenviable reputation which Quetta has acquired since the earthquake for this unpleasant skin infection. It may be noted that the sandfly fever admission ratio has also gone up considerably in this station. Bacteriological examinations of various pathological fluids were 700 in number, Northern Command (355), Southern Command (253), whereas in Eastern Command only 66 such examinations were done. The significance of this, if any, is difficult to understand. There were 257 specimens of the tæniidæ received during the year—240 were *T. saginata*, the largest number 106 coming from Southern Command, Poona leading the list. The remaining 17 were *T. solium*, Western one, Northern five, Eastern six, Southern five, thus shewing no particular incidence in any one command. Ninety-five rats were examined for possible plague infection the majority in Karachi, where a few cases of plague occurred. As the result of infection of the laboratory animals in this laboratory, the animal house was burned down in case of accidents. There were the usual small numbers of specimens from animals for examination and in some laboratories much work was done on mosquito identification. Snakes totalled 73, and Abbottabad appears to have headed the list producing 35 for identification.

The quantities of serum and agglutinable suspensions issued to laboratories by the Enteric Laboratory, Kasauli during 1937 were as follows. Dilute broth suspensions 104,450 c.cs., concentrated suspensions of *T. O. A. O.*, *B. O.*—5200 c.cs.—concentrated *Proteus* OX2, OX19, OXK, OXM—9610 c. cs., other suspensions 1200 c.cs.—agglutinating sera (50 varieties) 3858 c.cs., human sera (blood grouping) 50 c.cs. This has been a great increase over the 1936 issues, and is mainly due to the comparative tests on sera with the Dreyer and Felix technique.

In 1936 suspensions for injection in connection with the preparation of agglutinating serum were preserved with mercuric iodide, but owing to local damage due to leakage of a drop or two into the tissue of the ear, this method of preservation has been given up and formalinized preparations are now used as was the case prior to 1936.

Tissues sectioned and reported upon totalled 562, and included 128 reports on tumours. 114 brains mainly from dogs, but including also brain of horse, cat and several jackals were examined for rabies. In 34 negri bodies were demonstrated. Mann's stain seems to have been mainly employed, and it is reported that this stain gives better results if a mercurial fixative has been used for the brain in the first place.

The amount of tissue work done, apart from the size of the station, obviously depended on the interest taken in this work by the officer in charge of the laboratory. It is to be remembered however that even normal tissues are useful as practice for subordinate staffs, and that many civil hospitals are glad to have this work done for them. Autogenous vaccines increased particularly in Northern and Eastern Commands, 565 in all laboratories. Pregnancy tests were about the same as in 1936, Friedman's tests (25), Ascheim Zondek (17). In 99 per cent. cases the laboratory results were confirmed by the patients after history. Animal inoculations from guinea pigs totalled 442, virulence tests for *C. diphtheriæ* being 219, and for tubercle bacilli 156.

Four medical officers, six assistant surgeons and 14 sub-assistant surgeons were trained in laboratory duties.

Thirty-five assistant surgeons, and 33 sub-assistant surgeons received training in clinical side room duties during the year. The numbers still

untrained are smaller than was the case some years ago, but the importance of such training particularly as regards malaria and dysentery diagnosed cannot be overstressed, and full use should be made of the laboratories in this respect.

McCartney bottles have now replaced much of the glassware in all the laboratories, and it is recommended that they should also to a great extent replace test tubes, particularly those employed in the keeping of stock cultures.

With few exceptions nearly all the military laboratories are now equipped with up-to-date equipment, and within reason any special equipment requested for special work has been and can be provided annually.

Waziristan Operations, 1937.

25. These operations commenced early in March 1937 although in reality they were a continuation of the Khaisora operations which had been going on since the previous autumn.

The troops which were eventually included were the Wazir Division, the 1st Division and the 9th Brigade as well as ancillary units and Road Construction Battalions and the approximate strength was 4,700 British troops and 41,000 Indian troops and Followers.

The operations were carried out in three types of country each with different climates.

1. A high central area, dry and subject to fierce storms and great changes of temperature.
2. The lower valleys, hot and intensely malarious in July and August.
3. The plains, hot, dusty and at times very humid and parts of which are intensely malarious.

The general health of the troops was very satisfactory and compared favourably with other frontier campaigns.

Comparison with peace time and previous operations is difficult as many factors such as seasonal incidence have to be taken into account and also that in these operations the admissions to Field Ambulances as well as to hospitals were included. Some comparison however can be made by taking only the admissions from August to mid-November in these operations.

	Ratio per 1,000 per day.	
	British.	Indian.
Mohmand Bajaur Operations, 1933	16.85	5.91
Mohmand Operations, 1935	7.8	3.16
Waziristan Operations, 1937	4.49	2.61

Detailed statistics are given at the end of this section.

Evacuation by Air.—For the first time evacuation of casualties was carried out by air from Waziristan. Owing to the small number of suitable aircraft available the extent of air evacuation was limited. Aircraft were also used for dropping supplies. Evacuation of sick and wounded from Waziristan by road and rail is slow and tedious and has to be carried out by day, when shade temperatures in the hot weather may reach 125°F., as evacuation by night is not possible on account of enemy action. Vickers Valancia Pegasus machines were used and each could accommodate four lying and five sitting cases with one attendant.

Those cases requiring urgent surgical attention were selected and a total of 8 British officers and 29 British other ranks and 64 Indian other ranks were evacuated by air. The time taken from Bannu to Rawalpindi was $1\frac{1}{2}$ to two hours whereas by road and rail it would be about 12 hours without allowing for delays.

Malaria.—Out of an average strength of 4,736 British and 41,494 Indian troops, there were 4,698 admissions for malaria. In addition there were a number of cases of N. Y. D. fever which were subsequently diagnosed as malaria. Combining these two groups of diseases the admissions were:—

	British.		Indian.	
	Actual.	Ratio per 1,000.	Actual.	Ratio per 1,000.
Malaria and N. Y. D. Fever admissions	1,198	252.99	8,166	196.80

The malaria admissions in the various North West Frontier Operations shown in Table 28 cannot easily be compared on account of the different seasons at which the different operations were conducted but it will be seen that in the 1937 Operations in Waziristan the malaria rate was much less than in the 1933 and 1935 operations.

TABLE 28.

Comparison of malaria admissions in North West Frontier Operations.

		Average strength.	Admissions.	Ratio per 1,000.
Khajuri Plain Operations (October 1930 to March 1931).	B. O. Rs.	1,816	88	48.5
	I. O. Rs.	7,519	226	30.0
	B. O. Rs.	222	93	418.9
Mohmand-Bajaur Operations, 1933 (August to October).	I. O. Rs.	5,635	567	100.6
	B. O. Rs.	2,622	708	270.0
Mohmand Bajaur Operations, 1935 (August to November).	I. O. Rs.	9,940	1,192	119.9
	B. O. Rs.	1,380	14	10.1
Khaisora* Operations, 1936 (November to December).	I. O. Rs.	8,475	74	8.7
	B. O. Rs.	4,628	734	158.6
Waziristan Operations, 1937 (March to December).	I. O. Rs.	33,931	4,021	118.5

* British include officers and Indian include Followers.

Fresh infections commenced in May and the peak months were July and August. Table 29 shows the incidence of cases by months.

TABLE 29.

Waziristan Operations.

Malaria admissions by months—1937.

	Jan.	Feb.	March.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
British Officers	...	...	...	...	1	5	5	14	...	4	2	...	31
British Other Ranks	...	1	...	4	2	11	67	279	250	41	37	34	784
Indian Other Ranks	...	11	...	22	26	162	412	1,074	1,118	361	376	382	4,021
Followers	...	...	1	4	7	42	61	218	207	100	96	68	820

Mosquito breeding continued until 15th November and the use of mosquito nets was not stopped until 17th November although other anti-malarial precautions were continued after that date.

Local information regarding malaria was scanty and although warnings regarding the disease were issued as soon as it was seen that operations would extend over the summer, protective measures were commenced too late in many areas and extensive infection occurred among troops operating in the lower valleys. Breeding areas were often difficult to deal with as apart from pools near streams, anopheles larvæ were found freely along the sides of the streams hidden under the shingle which at a casual glance appeared to be quite dry. For obvious reasons also anti-malaria work at any distance from perimeter camps was usually impossible.

Confusion also occurred in the early period as mosquito nets were only available on the mobilisation scale of one net per two men, which meant that neither man was responsible for the net and it was often not available for either man. Eventually a scale of one net per man was made but even then the use of the peace time net at this scale was impracticable in 160 lb. and smaller tents.

A bivouac net on the scale of one per four men was taken into use after some delay in supply and distribution. This net is of undoubted value and when certain improvements have been made it will probably form part of the equipment for field service and training camps where peace pattern nets cannot be used.

An anti-mosquito cream consisting of oleum citronella 5 ozs., camphor $\frac{1}{4}$ oz., cedar wood oil $2\frac{1}{2}$ ozs., paraffin durum $7\frac{1}{2}$ ozs., paraffin molle white $12\frac{1}{2}$ ozs. was issued in 1 oz. aluminium screw cap containers and became one of the main lines of defence against malaria. Defence Department are being asked to have the cream issued in peace and war in lieu of P. C. oil, and the aluminium containers also made available in peace and war on a 25 per cent. basis.

Spraying with a solution of one part of liquid extract of pyrethrum in 63 parts of kerosene oil also proved most effective in camps, huts and barracks.

Anti-larval measures were carried out wherever possible but these and the making of malaria surveys were much hampered by enemy snipers.

Malaria and dysentery diagnosis panniers.—Six panniers fitted with microscopes and all the necessary reagents and apparatus for diagnosis of malaria and dysentery were eventually issued to Field Ambulances. Their issue to all Field Ambulances has now been sanctioned.

Water supplies.—The method of purification was by sedimentation with alum or aluminoferric in canvas tanks followed by chlorination with stabilised tropical bleach.

The time factor for sedimentation caused difficulty in areas where after heavy spates a very fine suspension of clay and mica is brought down stream. In these cases sedimentation takes six to 12 hours and an ample supply of canvas tanks is necessary but were not always available. During July and August in the Sham plain after a series of spates acute diarrhoea became universal among the troops in the area. The condition was due to crystalline deposits of mica in the water and the epidemic came to an end when adequate sedimentation of the water was carried out.

In the Gambila area the water was so heavily loaded with magnesium sulphate as to be undrinkable and drinking water had to be brought in by train.

Conservancy.—Buckets and seats for British troops and latrine pans and squatting plinths were provided as soon as possible to replace biscuit and other tins which were used. It was found that the peace pattern Ordnance latrine pans for Indian are too heavy and not readily portable and a light portable pan for field service is required.

A standard authorised pattern of latrine bucket and latrine seat for British troops is also required for field service.

Such equipment should be part of the unit equipment and accompany the unit on service.

The portable incinerator issued to Field Hygiene Sections was found to be of little use and the type of incinerator which was chiefly used consisted of a sheet of expanded metal turned up at the sides and raised on supports.

The method of choice for disposal of manure was by tight packing and proved very satisfactory when properly done. For a brigade camp the dimensions of packs were :—

(a) A triangular area 90×40 yards at the base.

(b) Four oblong packs each 32×5 yards ;

the height of the packs was approximately 6 ft. and the total amount of manure was about 175,000 c. ft.

Sanitary personnel.—In the early stages untrained or partly trained men only were available in many units, particularly the smaller ones. These operations proved the necessity for fully trained sanitary personnel to be available in sufficient numbers at the time of concentration. This is specially important in small units, detachments and units newly formed for the operations.

For British units the best type of man for training in sanitation is the senior soldier with experience of the country and in dealing with Indian subordinates. For Indian units, good trained N. C. Os. are useful but Indian privates are not as satisfactory as intelligent coolies.

Field Hygiene Sections.—Two of these units were very fully employed and were usually split up into sub-sections which were attached to Field Ambulances. There was a tendency to put unit sanitary responsibility on to Field Hygiene Sections and as their scope is so varied and as they have the appropriate personnel it was often found better to let them do the work rather than leave it undone.

The necessity for a Field Hygiene Section being one of the first units to arrive at any concentration area or new camp and for their starting work before insanitary conditions are allowed to develop was again demonstrated in these operations.

As a result of the experience gained in these operations the equipment of a Field Hygiene Section is to be re-organised.

Disinfestation.—Large numbers of Indian troops became lousy and British troops also but not to the same extent.

In permanent stations high pressure and Thresh disinfectors were available but the Thresh disinfectors were not sufficiently portable for the forward areas. A few portable disinfectors, locally constructed in Northern Command, were supplied to Field Hygiene Sections. In the autumn a further number were obtained from Ordnance but these arrived too late for thorough trials during the period of the operations. The question of their future supply and the authorisation of a disinfestation unit on a divisional basis is under consideration.

Cooling of vehicles.—Several methods of cooling ambulance cars and ferries were tried and the designs found most satisfactory were :—

1. Khus khus matting fitted over the whole body and lashed down on each side by ropes.
2. Khus khus screens in wooden frames fitted over the three openings in the front of the hood behind the driver's seat.

The Khus Khus matting was kept wet and even when it dried the temperature was five to 15° cooler than in unprotected cars. Rapid drying of the matting occurred and difficulty was experienced in wetting them sufficiently at midday halts until special personnel and appliances were provided for the purpose. Ice chests were also provided for ambulance cars.

Effects of heat.—There were only 21 cases among British and 10 among Indian troops. Included in this total were only four cases of heat-stroke among the British troops. The remainder were mild cases of heat exhaustion. This shows that, provided reasonable precautions are taken, that clothing is suitable, and ample cold drinks are available both British and Indian troops can work out of doors in the hot weather and the average healthy man does not require to be kept indoors all day.

Rations.—The summer scale of rations was found inadequate for troops doing hard work at a high altitude and certain alterations were necessary to supply the full needs of the soldier. Many young soldiers felt they were not getting enough to eat especially when they were out on road construction for 6 hours a day in addition to marching and picketting. The lack of a good breakfast was particularly felt and this was rectified by changing the scale to the winter ration which included the issue of bacon or its substitutes. The revision of the field service ration is now under consideration.

TABLE 30.

Waziristan Operations, 1937.

Statement showing direct admissions and transfers from Field Ambulances. Figures are compiled from A. Fs. A-31 (Monthly Returns of Sick in Hospital) received from C. I. M. Hospitals in Waziristan.

Diseases.	Officers with King's Commission.		British Other Ranks.		Indian Officers and Indian Other Ranks.		Followers.	
	Admissions.	Ratio per 1,000.	Admissions.	Ratio per 1,000.	Admissions.	Ratio per 1,000.	Admissions.	Ratio per 1,000.
Cerebro-spinal fever	...	...	...	...	5	0.1	...	...
Cholera	...	...	...	...	...	...	...	...
Common cold	4	4.7	8	1.7	266	7.8	47	7.7
Diphtheria	...	...	8	1.7	...	...	...	...
Influenza	7	8.2	10	2.2	153	4.5	31	5.1
Dysentery	11	12.9	114	24.6	462	13.6	60	9.9
Enteric group of fevers	...	...	4	0.9	16	0.5	4	0.7
Malaria	31	36.3	734	158.6	4021	118.6	820	135.1
Mumps	...	...	1	0.2	280	8.3	32	5.8
Pneumonia (lobar and lobular)	3	3.5	11	2.4	195	5.7	75	12.4
Rheumatic fever	...	...	7	1.5	27	0.8	4	0.7
Sandfly fever	15	17.6	143	32.0	430	12.7	112	18.6
Small-pox	...	...	...	...	1	0.03	...	...
Typhus fever	...	...	...	...	3	0.1	1	0.3
Venereal diseases	...	...	26	8.6	111	2.3	54	8.9
Minor septic diseases	32	37.5	333	73.0	769	22.7	172	28.3
Tonsillitis	14	16.4	175	37.8	168	5.0	23	4.6
Pharyngitis	8	9.4	60	13.0	867	25.6	157	25.9
Diarrhoea	26	30.5	257	55.5	700	20.6	81	13.3
Scabies	...	...	2	0.4	275	8.1	85	14.0
Heat exhaustion	3	3.5	17	3.7	10	0.3	2	0.3
Heat stroke	...	...	4	0.9	...	...	...	...
Local injuries	46	53.9	256	55.3	1772	52.2	235	47.0
G. S. wound (in action)	14	16.4	62	13.4	388	11.4	17	2.8
All other causes	130	152.4	1003	216.7	3693	108.8	939	154.7
Total	344	403.3	3245	701.2	14612	430.6	3006	495.4

Actuals.

Ratio per 1,000.

	Average strength.	Actuals.		Average number constantly sick.	Ratio per 1,000.		
		Admissions.	Deaths.		Admissions.	Deaths.	Constantly sick.
British Officers	853	344	12	5.21	403.3	14.07	6.11
British Other Ranks	4628	3245	10	75.96	701.2	4.11	16.41
Indian Officers and Indian Other Ranks	33931	14612	96	441.15	430.6	2.83	13.00
Followers	6068	3006	25	80.22	495.4	4.12	13.22

* Based on the Report on the Health of Troops rendered by the Assistant Director of Hygiene and Pathology, Northern Command.

APPENDIX I.

Radiology.

No. of patients examined	{	British	14,905	
		Indian	10,877	
		Civilian	1,644	
No. and nature of examinations carried out.	{	Bones and Joints	{ Injury	16,800
			{ Disease	2,269
			{ Sinuses	916
		Teeth.	968	
		Lungs	3,312	
		Heart	128	
		Gastro intestinal	676	
		Liver and gall bladder	324	
		Urinary tract	984	
		Genital tract	94	
		Miscellaneous	538	
		Foreign body	236	
Pregnancy	78			
Number in which a contrast medium was used and nature of medium.	{	Barium	608	
		Shadacol	122	
		Uro-selection B.	122	
		Per Abrodil etc.	36	
Miscellaneous information.	{	No. of ordinary films used	38,112	
		No. of dental films	3,580	
		No. of exposures	55,029	
		No. of prints	13	
		No. of screen exams.	534	

APPENDIX II.

Surgical Operations, 1937.

King's Commissioned Officers of the British Service.

Operations.	Total numbers.	Recovered.	Invalided.	Died.	Remarks.
<i>Nervous system.</i>					
Neurectomy	1	1	..	..	
<i>Throat, ear and nose.</i>					
Tonsillectomy	4	4	..	..	
Nasal Polypi	1	1	..	..	
Incision ear drum	1	1	..	..	
Intra-nasal antrotomy	1	1	..	..	
Mastoidectomy	1	1	..	..	
<i>Blood vessels.</i>					
Varicose veins	1	1	..	..	
<i>Respiratory diseases.</i>					
Empyema	2	2	..	..	
<i>Digestive diseases.</i>					
Laparotomy	1	..	..	1	
Appendicectomy	29	29	..	..	
Drainage of intra-peritoneal abscess	1	1	..	..	
Fibroma stomach	1	..	..	1	
Retroperitoneal haemorrhage	4	4	..	..	
Paralytic ileus	1	..	..	1	
Hernia	2	2	..	..	
Cholecystectomy	1	1	..	..	
Fistula	4	4	..	..	
Fissure	2	2	..	..	
Ischiorectal abscess	1	1	..	..	
Others	5	5	..	..	
<i>Diseases of generative system</i>	1	1	..	..	
<i>Bones and Joints.</i>					
Fractures manipulated and set	36	34	1	1	
Fracture open operation	6	6	..	..	
Manipulations for dislocation	10	10	..	..	
Manipulation for adhesions	1	1	..	..	
Meniscectomy, external	1	1	..	..	
Displaced semi-lunar cartilage reduction	2	2	..	..	
Loose body knee joint	1	..	1	..	
Arthritis deessicans	2	2	..	..	
<i>Skin and subcutaneous tissues.</i>					
Carbuncle excision	1	1	..	..	
I. A. T.	20	19	1	..	
Abscesses incisions	9	9	..	..	
Whitlows	2	2	..	..	
Removal foreign body	4	4	..	..	
Haematoma	2	2	..	..	
Operations on nails	2	2	..	..	
Cutaneous leishmaniasis	1	1	..	..	
Ulcers	2	2	..	..	

Operations.	Total numbers.	Recovered.	Invalid.	Died.	Remarks.
<i>Tumours and cysts.</i>					
Papilloma	1	1	..	..	
Lipoma	2	2	..	..	
Keloid scars	1	1	..	..	
Sebaceous and other cysts	6	6	..	..	
<i>Injuries.</i>					
Buttock (foreign body)	1	1	..	..	
Arm	3	3	..	..	
Spine	1	..	1	..	
Head	1	..	..	1	
Wounds and injuries, various	6	5	1	..	
Wounds excision	2	2	..	..	
King's Commissioned Officers of the Indian Service.					
<i>Throat, nose and ear.</i>					
Tonsillectomy	1	1	..	..	
Septum nose	4	4	..	..	
Otitis media	1	1	..	..	
<i>Glands.</i>					
Lymphadenitis chronic	2	2	..	..	
<i>Digestive diseases.</i>					
Appendicectomy	12	11	..	1	
Hernia	2	2	..	..	
Fistula in ano	1	1	..	..	
Ischiorectal abscess	1	1	..	..	
<i>Genito urinary.</i>					
Hydrocele	1	1	..	..	
Vesical calculus	1	1	..	..	
<i>Bones and Joints.</i>					
Fractures manipulated and set	8	8	..	..	
Removal of medial meniscus	1	1	..	..	
Manipulation of knee for adhesions	2	2	..	..	
<i>Skin and subcutaneous tissues.</i>					
I. A. T., drainage	1	1	..	..	
Removal of sebaceous cyst	1	1	..	..	
Removal of foreign body	2	2	..	..	
Multiple injuries	1	1	..	..	
Abscesses and sinuses	3	3	..	..	
Rodent ulcer	1	1	..	..	
Others	2	2	..	..	

British Women and Children.

Eye.

Extirpation lacrymal sac	2	2	..	..	
------------------------------------	---	---	----	----	--

Operations.	Total numbers.	Recovered.	Invalided.	Died.	Remarks.
<i>Throat, nose and ear.</i>					
Tonsillectomy	97	96	..	1	
Salivary calculus	1	1	..	..	
Adenoma partial resection	1	1	..	..	
Mastoidectomy	3	3	..	..	
Antrum drainage	3	3	..	..	
<i>Digestive system.</i>					
Hernia	12	12	..	..	
Appendicectomy	39	39	..	..	
Cholecystectomy	1	1	..	..	
Jejunostomy	1	..	..	1	
Laparotomy	2	2	..	..	
Other abdominal diseases	8	8	..	..	
<i>Generative (female).</i>					
Endometritis	2	2	..	..	
Oophorectomy	3	3	..	..	
Hysteropexy	2	2	..	..	
Caesarean section	8	7	..	1	
Cauterisation of cervix	3	3	..	..	
Curettage	5	5	..	..	
Salpingectomy	1	1	..	..	
Vaginal myomectomy	2	2	..	..	
Ruptured tubal gestation	3	3	..	..	
Incomplete abortion	11	11	..	..	
Cystocele and rectocele	3	3	..	..	
Retained placenta	2	2	..	..	
Colpo-perinaeosphaphy	3	3	..	..	
Ectopic gestation	3	3	..	..	
Others	8	8	..	..	
<i>Generative (male).</i>					
Circumcision	34	34	..	..	
Congenital hydrocele	4	4	..	..	
<i>Joints, bones, muscles and tendons.</i>					
Hallux valgus	4	4	..	..	
Dislocation manipulation	26	26	..	..	
Fractures	20	19	..	1	
Aspiration ankle joint	4	4	..	..	
Amputations	2	2	..	..	
Insertion of wires for traction	2	1	1	..	
Ganglion excision	4	4	..	..	
Plaster of Paris, splints	4	4	..	..	
Osteomyelitis of mandible	1	1	..	..	
<i>Skin and subcutaneous tissues.</i>					
Excision of sinus	6	5	..	1	
Abscesses	11	11	..	..	
Revision and suture of wounds	2	2	..	..	
Removal of foreign body	4	4	..	..	
Operation on nails	4	4	..	..	
I. A. T.	20	20	..	..	
Others	7	7	..	..	

Operations.							Total numbers.	Recovered.	Invalided.	Died.	Remarks
<i>Tumours and cysts.</i>											
Lipoma	.	.	.	.	.	.	1	1	..	..	
Papilloma	.	.	.	.	.	.	1	1	..	..	
Cysts	.	.	.	.	.	.	11	11	..	..	
<i>Urinary diseases.</i>											
Cystoscopy	.	.	.	.	.	.	1	1	..	..	
British, all others (R. N., R. A. F. etc.).											
<i>Eye.</i>											
Iridectomy	.	.	.	.	.	.	1	1	..	..	
<i>Ear, throat and nose.</i>											
Mastoidectomy	.	.	.	.	.	.	1	1	..	..	
Tonsillectomy	.	.	.	.	.	.	36	36	..	..	
Nasal reconditioning	.	.	.	.	.	.	1	1	..	..	
<i>Generative (male).</i>											
Circumcision	.	.	.	.	.	.	6	6	..	..	
Orchidopexy	.	.	.	.	.	.	1	1	..	..	
<i>Generative (female) British Women and Children.</i>											
Hysteropexy	.	.	.	.	.	.	2	2	..	..	
Surgical induction of labour	.	.	.	.	.	.	3	3	..	..	
<i>Bones, joints, muscles and tendons.</i>											
Fractures manipulated and set	.	.	.	.	.	.	12	12	..	..	
Osteoarthritis	.	.	.	.	.	.	2	2	..	..	
Passive movements	.	.	.	.	.	.	6	6	..	..	
Tendon lengthening	.	.	.	.	.	.	1	1	..	..	
<i>Skin and subcutaneous tissues.</i>											
I. A. T.	.	.	.	.	.	.	5	5	..	..	
Whitlows	.	.	.	.	.	.	1	1	..	..	
Avulsion of nails	.	.	.	.	.	.	2	2	..	..	
Injuries cleaned and sutured	.	.	.	.	.	.	2	2	..	..	
Abscesses	.	.	.	.	.	.	6	6	..	..	
Gassettection	.	.	.	.	.	.	1	1	..	..	
Incision for lymphadenitis	.	.	.	.	.	.	1	1	..	..	
Others	.	.	.	.	.	.	4	4	..	..	
<i>Tumours and cysts.</i>	.	.	.	.	.	.	8	8	..	..	
Warrant Officers, N. C. Os. and Men of the British Army.											
<i>Eye.</i>											
Enucleation eye	.	.	.	.	.	.	1	1	..	..	
Iridectomy	.	.	.	.	.	.	1	1	..	..	
Pterygium	.	.	.	.	.	.	1	1	..	..	
Plastic for ectropion	.	.	.	.	.	.	1	1	..	..	
Other diseases of eye	.	.	.	.	.	.	7	7	..	..	

Operations.	Total numbers.	Recovered.	Invalid.	Died.	Remarks.
<i>Ear, nose and throat.</i>					
Tonsillectomy	97	97	..	..	
Deviation of nasal septum	10	10	..	..	
Mastoidectomy	8	7	..	1	
Trigeminal neuralgia	1	1	..	..	
Incision of membrana tympani	1	1	..	..	
Furunculosis ear incision	11	11	..	..	
Otitis media paracentesis	2	2	..	..	
Acute sinusitis	1	1	..	..	
Antrum punctured	27	27	..	..	
<i>Veins, arteries and nerves.</i>					
Ligation of arteries	1	1	..	..	
Blood vessels	5	5	..	..	
Varix	4	4	..	..	
Blood transfusion	4	3	1	..	
Neurectomy	1	1	..	..	
Transplantation of nerve	2	2	..	..	
Lumbar puncture	6	6	..	..	
<i>Lymphatic system.</i>					
Excision or incision of glands	40	40	..	..	
Climatic bubo	1	1	..	..	
<i>Ductless glands.</i>					
Hemithyroidectomy	4	3	1	..	
<i>Respiratory.</i>					
Pulmonary tuberculosis	1	1	..	..	
Empyema	29	29	..	..	
Aspiration pleural cavity	1	1	..	..	
<i>Digestive.</i>					
Hernia	112	112	..	..	
Appendicectomy	269	268	..	1	
Cholecystectomy	3	3	..	..	
Intestinal obstruction	3	2	..	1	
Laparotomy	9	5	..	4	
Ischiorectal Abscess drainage	5	5	..	..	
Salivary calculus	1	1	..	..	
Fistula	4	4	..	..	
Fissure in ano	14	14	..	..	
Peritonitis drainage	2	2	..	..	
Liver abscess (streptococcal)	3	2	..	1	
Gastric ulcer	2	1	..	1	
Aspiration of liver	3	3	..	..	
Other digestive diseases	85	81	..	4	

Operations.	Total numbers.	Recovered.	Invalided.	Died.	Remarks.
<i>Generative (Male).</i>					
Meatotomy	9	9	..	..	
Fraenum—wedge excision	1	1	..	..	
Varicocele	41	41	..	..	
Sinus scrotum	1	1	..	..	
Epididymectomy	1	1	..	..	
Hydrocele	28	28	..	..	
Orchidectomy	6	6	..	..	
Circumcision	131	131	..	..	
Paraphimosis	14	14	..	..	
Urethral obstruction	2	2	..	..	
Undescended testical operation	2	2	..	..	
Others	3	3	..	..	
<i>Bones and joints.</i>					
Fractures manipulated and set	495	489	4	1	1 still in hospital.
Amputation	14	13	1	..	
Hammer toe	60	60	..	..	
Arthrotomy	3	3	..	..	
Sequestrectomy	18	18	..	..	
Removal of foreign body	40	40	..	..	
Hallux valgus	21	20	..	..	1 still in hospital.
Arthritis aspiration	79	79	..	..	
Local injury	5	5	..	..	
Passive movements	4	4	..	..	
Reconstruction acromioclavicular joint	4	4	..	..	
Removal and insertion of extension wire	9	9	..	..	
Partial phalangectomy	3	3	..	..	
Exostosis finger removal	7	7	..	..	
Dislocation manipulation	10	10	..	..	
Compound fractures drainage	8	2	5	1	
Disarticulation hip joint	1	..	..	1	
Plaster of Paris	13	13	..	..	
Bursitis	5	5	..	..	
Removal of cartilage	56	55	1	..	
Ruptured internal, semilunar cartilage	43	43	..	..	
Aspiration knee	14	14	..	..	
Others	7	6	1	..	
<i>Skin and subcutaneous tissues.</i>					
I. A. T.	634	632	..	2	
Abscesses	98	98	..	..	
Whitlows	10	10	..	..	

Operations.	Total numbers.	Recovered.	Invalided.	Died.	Remarks.
Cutaneous leishmaniasis	5	5	..	..	
Plastic operations	4	4	..	..	
Avulsion of nails	92	92	..	..	
Ganglion excision	19	19	..	..	
Incision, hand, etc.	22	22	..	..	
Wounds cleaned, excised and sutured	44	44	..	..	
Removal of warts	11	11	..	..	
Others	33	33	..	..	
<i>Urinary.</i>					
Ruptured bladder	1	..	..	1	
Nephrectomy	8	7	..	1	
Pyelolithotomy	1	..	..	1	
Haematuria	1	1	..	..	
Suprapubic cystotomy	2	2	..	..	
<i>G. S. wounds.</i>					
G. S. wounds	84	81	..	3	
<i>Cysts and tumours.</i>					
Papilloma	13	13	..	..	
Lipoma	4	4	..	..	
Neuroma	1	1	..	..	
Keloid	2	2	..	..	
Polypus	4	4	..	..	
Cysts	228	228	..	..	
<i>Miscellaneous.</i>					
Cysticercosis	1	1	..	..	
Hypertrophied male breast removal	2	2	..	..	
British Military Family Hospitals.					
Nose and throat	27	27	..	..	
Blood vessels	1	1	..	..	
Lymphatic system	1	1	..	..	
Abdomen	6	6	..	..	
Circumcision	6	6	..	..	
Female generative organs	40	40	..	..	
Bones	4	4	..	..	
Others	20	20	..	..	

Anaesthetics.

Anaesthetics.											Total numbers.
Chloroform	.	.	.	.	.	.	.	.	.	.	90
Chloroform and ether	.	.	.	.	.	.	.	.	.	.	1,206
Ether	.	.	.	.	.	.	.	.	.	.	486
Open C. E. 2 mixture	.	.	.	.	.	.	.	.	.	.	66
Evipan	.	.	.	.	.	.	.	.	.	.	816
Evipan ether	.	.	.	.	.	.	.	.	.	.	39
Open ethyl chloride and ether	.	.	.	.	.	.	.	.	.	.	62
Nitrous oxide	.	.	.	.	.	.	.	.	.	.	1,633
Paraldehyde and morphia with ether	.	.	.	.	.	.	.	.	.	.	1
Ethyl chloride	.	.	.	.	.	.	.	.	.	.	331
Spinal stovaine	.	.	.	.	.	.	.	.	.	.	58
Amylocaine spinal	.	.	.	.	.	.	.	.	.	.	15
Spinal percaine	.	.	.	.	.	.	.	.	.	.	85
Spinal Blocks	.	.	.	.	.	.	.	.	.	.	103
Sacral Blocks	.	.	.	.	.	.	.	.	.	.	3
Cocaine	.	.	.	.	.	.	.	.	.	.	40
Ethocaine	.	.	.	.	.	.	.	.	.	.	70
Percaine	.	.	.	.	.	.	.	.	.	.	7
Stovaine	.	.	.	.	.	.	.	.	.	.	16
Local, miscellaneous	.	.	.	.	.	.	.	.	.	.	1,373

SECTION II.

ON THE HEALTH OF THE INDIAN ARMY FOR THE YEAR 1937.

General.

26.

TABLE A.

	Admissions.			Deaths.		Invalids sent to United Kingdom.		Invalids discharged in India.		Average constantly sick.	
	Average strength.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.
Officers	1,841]	661	359·0	8	4·35	17	9·23	...	...	21·19	11·51
Indian Ranks	98,901	38,735	391·7	175	1·77	...	...	543	5·49	1,498·18	15·15
Followers	23,701	6,613	279·0	94	3·96	...	...	94	3·96	233·15	9·84
Others*	...	1,661	...	25	...	...	...	57	...	...	...

The health statistics of officers and Indian ranks for the quinquennial periods 1925-29, 1930-34 with those for 1935, 1936 and 1937 are given separately in the following table for purposes of comparison :—

TABLE B.

Period.	Ratio per 1,000.					
	Admissions.		Invalids.		Deaths.	
	King's Commissioned officers.	Indian ranks.	King's Commissioned officers.	Indian ranks.	King's Commissioned officers.	Indian ranks.
1925—29	498·0	385·6	5·22	10·8	4·74	3·48
1930—34	336·7	453·3	12·47	6·55	5·37	2·63
1935	346·8	422·7	6·82	5·54	7·31	2·15
1936	364·3	426·5	5·34	5·52	4·37	2·16
1937	359·0	391·7	9·23	5·49	4·35	1·77

Officers.

27. The admission rate of officers sick in hospital for 1937 is 359·0 per 1,000 of strength as compared with 364·3 in 1936.

*Includes Reservists, Indian Territorial Forces, Royal Indian Marine, Indian States Forces, R. A. F., Civilians and Pensioners.

The principal causes of sickness were—

TABLE C.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1936.	
			Increase.	Decrease.
Digestive diseases other than tonsillitis, appendicitis and diarrhoea	87	47.3	..	4.7
Local injuries	77	41.8	..	2.4
Malaria	70	38.0	4.0	..
Minor septic diseases	61	33.1	7.4	..
Dysentery	48	26.1	6.2	..
Common cold	27	14.7	7.4	..
Appendicitis	26	14.1	2.4	..
Sandfly fever	26	14.1	..	9.7
Tonsillitis	25	13.6	..	11.2
Ear and nose	25	13.6	2.9	..
Influenza	19	10.3	1.6	..
Respiratory diseases	19	10.4	..	3.7
Diarrhoea	19	10.3	..	3.3
Diseases of bones, joints, muscles, fasciae and bursae	18	9.8	1.1	..
Urinary diseases	13	7.1	..	1.2

There were eight deaths of which four were due to injuries, and four to other diseases, *viz.*, appendicitis two, meningitis one, lobar pneumonia one.

Soldiers.

28. 38,735 or 391.7 per 1,000 of the strength were admitted to hospital, compared with 426.5 in 1936. There is thus a decrease of 34.8 per 1,000 compared with the 1936 figures.

The principal causes of admissions to hospital were—

TABLE D.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1936.	
			Increase.	Decrease.
Malaria	9,687	97·9	..	25·2
Local injuries	5,122	51·8	..	0·8
Minor septic diseases	3,105	31·4	..	2·0
Pharyngitis	1,589	16·1	..	4·5
Bronchitis	1,245	12·6	1·3	..
Dysentery	1,226	12·4	1·4	..
Common cold	1,139	11·5	0·9	..
Venereal diseases	812	8·1	..	1·7
Scabies	761	7·7	..	..
Mumps	736	7·4	2·3	..
Sandfly fever	594	6·0	..	4·6
Tonsillitis	570	5·8	..	0·1
Influenza	565	5·7	..	1·6
Conjunctivitis	560	5·7	..	0·5
Diarrhoea	535	5·4	..	0·8
Pneumonia (lobar and lobular)	514	5·2	..	0·2
Dengue	501	5·1	2·6	..
Ankylostomiasis	416	4·2	..	1·3
Indigestion	401	4·1	0·4	..
Ringworm	344	3·5	0·5	..
Dermatitis	297	3·0	0·2	..
Constipation	286	2·9	..	0·5
Eczema	270	2·7	0·3	..
Otitis media	261	2·6	..	..
Synovitis	260	2·6	..	0·2
Myalgia	237	2·4	..	0·1
Coryza	235	2·4	..	0·4
Dracontiasis	209	2·1	0·6	..
Rhinitis	205	2·1	..	0·5
Pleurisy	176	1·8	..	0·1
Measles	175	1·8	0·5	..
Trachoma	167	1·7	..	0·3
Piles	166	1·7	0·1	..
Pulmonary tuberculosis	159	1·6	..	0·1
Keratitis ulcerative	157	1·6	0·2	..
Colic	152	1·5	0·2	..
Jaundice catarrhal	148	1·5	..	0·2
Appendicitis	138	1·4	..	0·2
Anaemia secondary	136	1·4	0·2	..
Oriental sore	135	1·4	..	0·1
Sciatica	115	1·2	0·1	..
Lumbago	102	1·0	..	..
Ascariasis	101	1·0	..	0·2
Gastritis	100	1·0	..	0·3
Renal colic	95	1·0	..	0·1

The death rate shows a decrease of 0.39 per 1,000 from 2.16 in 1936 to 1.77 in 1937.

The main causes of deaths were—

TABLE E.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1936.	
			Increase.	Decrease.
Local injuries	41	0.41	0.06	..
Pneumonia (Lobar and lobular)	34	0.34	..	0.27
Pulmonary tuberculosis	12	0.12	..	0.01
Circulatory diseases	11	0.11	..	0.02
Meningococcal infection	10	0.10	0.07	..
Enteric group of fevers	9	0.09	0.05	..
Digestive diseases	9	0.09	..	0.04
General injuries	7	0.07	..	0.05
Tuberculosis (other than pulmonary)	6	0.06	0.03	..
Dysentery	4	0.04	0.01	..
Malaria	4	0.04	..	0.03
Urinary diseases	4	0.04	0.01	..
Nervous diseases	3	0.03	..	0.06

Invalids.—There were 543 or 5.49 per 1,000 invalids discharged during the year, this is 0.03 per 1,000 less than in 1936.

TABLE F.

Principal causes of invaliding.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1936.	
			Increase.	Decrease.
Pulmonary tuberculosis	144	1.46	..	0.20
Injuries	77	0.78	..	0.24
Diseases of bones, joints, muscles, fasciae and bursae	44	0.44	..	0.01
Mental diseases	88	0.88	0.05	..
Respiratory diseases	83	0.83	0.06	..
Diseases of the eye	31	0.31	..	0.05
Diseases of the nervous system	27	0.27	..	0.01
Circulatory diseases	21	0.21	0.03	..
Digestive diseases	21	0.21	0.05	..
Other tubercular diseases	19	0.19	0.06	..
Diseases of urinary organs	11	0.11	0.04	..
Diseases of ear and nose	10	0.10	0.02	..
Venereal diseases	9	0.09	0.06	..
Leprosy	7	0.07	0.01	..
Diseases of blood	5	0.05	..	0.08

The average number constantly sick in hospital was 1,498·18 or 15·15 per 1,000 of the strength, compared with 15·43 in 1936.

The average sick time to each soldier was 5·53 days and the average duration of each case 14·12 days; the corresponding figures were 5·65 and 13·24 in 1936.

120,567 men, or 1,219·1 per 1,000 of the strength, were treated as out-patients compared with 1,343·3 per 1,000 in 1936. The average daily number under treatment in barracks was 1,765·16 or 17·85 per 1,000, compared with 19·50 per 1,000 in 1936.

The combined ratio constantly sick in hospital and under treatment as out-patients was 33·00 per 1,000 of the strength, compared with 34·93 in 1936.

The above represents a loss of 546,836 men days in hospital and 644,283 men days treated in barracks or a total loss of 1,191,119 men days in the year.

Table G on pages 68-69 shows admissions and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 2,000 and upwards compared with all-India.

The statistics as a whole show that the health of the Indian Army was very good.

Admissions to hospital for Indian ranks were 34·8 per 1,000 less than last year. The invaliding rate and the death rate have also decreased.

PRINCIPAL DISEASES AFFECTING THE INDIAN ARMY.

Cerebro-spinal Meningitis.

29. The incidence during the year was as follows :—

	Cases.	Deaths.	Case mor- tality per cent.
Combatants	17	10	59
Followers	2	2	100
	<u>19</u>	<u>12</u>	<u>63</u>

The seasonal and geographical distributions of the total Indian cases were—

	Total.
January—Meerut 1, Lahore 2, Rawalpindi 1, Sialkot 1	5
February—Lahore 1, Nowshera 1	2
March—Peshawar 1, Rawalpindi 1	2
April—Lahore 2	2
May—Lahore 1, Rawalpindi 2, Ambala 1	4
June—Ambala 1	1
November—Ambala 1, Shagai 1, Jullundur 1	3
GRAND TOTAL	<u>19</u>

The age incidence was chiefly between 17 and 20 years. Of the 17 cases among Combatants 7 were recruits.

TABLE

Table showing admission and death ratios per 1,000 of the strength for all causes compared

Stations with total admission ratios, all causes, higher than all-India.

Stations.	Dehra Dun.	Abbot- tabad.	Fort Sande- man.	Jubbul- pore.	Kohat.	Now- shera.	Rawal- pindi.	Wana.	Ambala.
Strength	2,367	2,226	2,502	2,076	3,293	2,489	3,486	3,511	2,233
All causes	{ A. 546.8 D. 2.53 Av.O. 23.76 Sick. 14.04	{ 502.7 2.70 13.83	{ 497.6 1.60 13.83	{ 487.5 ... 17.03	{ 467.1 1.82 16.97	{ 447.6 0.80 16.12	{ 446.4 1.72 18.07	{ 405.6 2.28 16.39	{ 401.3 1.84 17.50

Analysis of the above total admission rates.

Malaria	{ A. 89.6 D. ..	{ 278.5 ...	{ 232.6 ...	{ 91.5 ..	{ 122.7 ..	{ 63.5 ...	{ 108.7 ..	{ 143.0 ..	{ 43.0 ..
Sandfly fever	{ A. .. D. ..	{ 22.0 ..	{ 13.6 ..	{	{ 10.9 ..	{ 15.3 ..	{ 19.5 ..	{	{ 5.4 ..
Enteric group	{ A. 2.5 D. 0.42	{ 0.4 0.45	{ 1.6 ..	{ 1.0 ..	{ 0.6 ..	{ 2.8 ...	{ 1.5 ...	{ 0.6 ..	{ 1.8 ..
Dysentery	{ A. 10.1 D. ..	{ 10.7 ..	{ 7.2 ..	{ 20.7 ..	{ 14.8 ..	{ 7.2 ..	{ 17.0 ..	{ 6.2 0.28	{ 17.9 ..
Diarrhoea	{ A. 3.4 D. ..	{ 0.4 ..	{ 5.6 ..	{ 8.2 ..	{ 11.2 ..	{ 10.8 ..	{ 5.2 ..	{ 2.3 ..	{ 1.3 ..
Influenza	{ A. 3.8 D. ..	{	{	{ 3.9 ..	{	{ 3.2 ..	{ 27.0 ...	{ 15.9 ...	{ 5.4 ..
Pneumonia lobar & lobular	{ A. 8.9 D. ..	{ 4.9 0.45	{ 6.4 ...	{ 1.4 ...	{ 6.4 0.30	{ 3.2 0.40	{ 5.2 ..	{ 7.4 0.28	{ 10.3 0.45
Venereal diseases	{ A. 16.1 D. ..	{ 4.9 0.45	{ 5.6 ..	{ 6.3 ..	{ 7.3 0.30	{ 3.2 ..	{ 7.2 ..	{ 4.8 ..	{ 7.6 ..
Minor septic diseases	{ A. 62.5 D. ..	{ 19.3 ..	{ 18.8 ..	{ 56.8 ..	{ 33.4 ..	{ 49.0 ..	{ 29.8 ..	{ 15.4 ..	{ 48.8 ..
Local injuries	{ A. 93.4 D. ..	{ 44.0 ..	{ 61.2 ...	{ 74.2 ...	{ 44.6 0.30	{ 82.8 ...	{ 42.2 0.57	{ 72.5 1.71	{ 64.0 ...
Heat-stroke	{ A. .. D. ..	{	{	{	{	{	{	{	{
Heat-exhaustion	{ A. ... D. ...	{	{	{	{	{ 3.6 ..	{	{	{
Ankylostomiasis	{ A. ... D. ..	{ 4.0 0.45	{ 4.0 ..	{ 2.4 ..	{ 9.4 ..	{ 9.2 ..	{ 7.5 ..	{ 4.6 ..	{ 9.9 ..
Pulmonary tuberculosis	{ A. 2.5 D. 1.27	{ 1.3 0.45	{ 2.4 ..	{ 1.4 ...	{ 2.1 0.30	{ 1.2 ...	{ 2.6 ..	{ 0.9 ..	{ 0.4 ...

A.—Admissions. D.—Deaths.

G.

and certain important diseases for stations with a strength of 2,000 and upwards, with all-India.

Stations with *total* admission ratios, all causes, lower than all-India.

Bangalore.	Quetta.	All-India.	Lahore.	Poona.	Trimulgherry.	Peshawar.	Meerut.
2,598	4,206	98,901	2,368	3,725	2,997	5,721	2,417
397.2	398.7	391.7	375.4	375.3	357.0	355.7	283.0
1.15	1.90	1.77	8.88	0.27	1.00	2.10	2.48
20.45	20.17	15.15	14.04	13.10	14.38	15.39	12.55

Analysis of the above total admission rates.

18.9	156.0	97.8	50.7	100.1	18.7	86.9	44.3
..	0.24	0.04	...	...	...	...	...
...	6.4	6.0	2.5	0.3	1.0	17.8	...
...	...	...	...	...	...	...	...
0.8	0.2	0.9	2.1	0.3	...	1.7	1.2
..	...	0.09	...	...	...	...	0.41
18.6	11.2	12.4	5.8	26.5	27.7	20.3	18.6
...	0.24	0.04	...	...	...	0.17	...
2.3	4.3	5.4	12.2	4.8	2.0	1.9	4.6
..	...	...	...	...	...	...	...
4.2	3.1	5.7	...	23.1	10.3	0.2	0.4
...	...	...	...	...	...	...	...
4.2	2.6	5.2	5.6	3.2	1.0	5.2	3.7
...	0.24	0.34	...	...	0.33	0.35	0.41
19.6	0.4	8.1	8.4	16.4	7.3	6.6	5.8
...	...	0.01	...	...	...	...	...
25.0	12.4	31.4	54.1	33.3	41.4	26.6	21.9
...	...	...	...	...	...	...	...
100.8	36.1	52.0	58.3	39.2	94.1	33.6	45.9
..	0.48	0.41	1.27	...	...	0.35	1.24
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
...	0.7	0.3	...	0.5	...	...	...
...	...	..	...	...	...	...	...
1.2	10.2	4.2	4.2	2.4	3.8	0.5	...
...	...	...	...	...	...	...	...
0.8	0.7	1.6	3.0	1.6	2.3	1.4	1.6
...	...	0.12	...	...	...	0.17	...

Av. C. Sick.—Average constantly sick.

Dengue.

30. Five hundred and one cases were admitted for this disease giving a ratio of 5·1 per 1,000 compared with 2·5 in 1936. The stations principally affected were—

	Actuals.	Ratio per 1,000.
Dacca	293	548·7
Alipore	98	137·6
Bangalore	80	30·8
Madras	17	31·1

Typhus Fever.

31. There were 43 cases among Indian ranks and the distribution and type are given in Section I, page 14.

Majority of these cases occurred in Northern and Southern Commands all the year round.

This disease is dealt with in greater detail in the Section of the report on British troops.

Sandfly Fever.

32. There were 594 cases in 1937 compared with 1,236 in 1936, thus giving ratios per 1,000 of 6·0 and 10·6 respectively.

The incidence was chiefly as follows :—

	Ratio per 1,000.
Rawalpindi District	18·0
Peshawar District	15·6
Sind Brigade	13·7
Zhob Independent Brigade	10·9
Kohat District	8·0
Baluchistan District	7·1

Dysentery, Diarrhoea and Colitis.

33.

TABLE I.

Years.	Dysentery.		Diarrhoea.		Colitis.		Total.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1933 . . .	1,804	15·3	933	7·9	30	0·3	2,767	23·5
1934 . . .	1,632	13·9	742	6·3	28	0·2	2,402	20·5
1935 . . .	1,424	12·2	651	5·6	21	0·2	2,096	17·9
1936 . . .	1,277	11·0	726	6·2	39	0·3	2,042	17·5
1937 . . .	1,226	12·4	535	5·4	44	0·4	1,805	18·3

The admissions for different types of dysentery are given below and the percentage of each type remain very much the same as in 1936 :—

	Actual admissions.	Percentage.
Dysentery protozoal	75	6.12
Dysentery bacillary (proved bacteriologically)	651	53.10
Dysentery bacillary exudate (no dysentery bacilli isolated)	247	20.15
Dysentery clinical	253	20.63

Only four deaths occurred in the 1,226 dysentery cases thus giving a case mortality of 0.33 per cent.

There is a slight increase in the ratio of admissions for dysentery and a slight reduction in the diarrhoea incidence.

The importance of bazaars sudder and municipal as regards fly infection is even greater than in the case of British troops, as the Indian troops frequent these bazaars to a greater extent and purchase foodstuffs, sweets, etc., exposed to fly infection.

In Mardan where an increase of dysentery occurred concurrent with a fly plague, a refuse dump covering several acres and breeding flies in enormous numbers existed within 400 yards of the bungalow of a civil official. This is an excellent example of the necessity for combined sanitary boards comprising military and civil authorities in all stations.

The distribution of dysentery by Commands is given below :—

Dysentery. (Ratio per 1,000.)				
	Amoebic.	Bacillary (bacteriologically proven).	Bacillary exudate.	Clinical.
Northern Command	0.7	5.4	1.8	3.3
Western Command	0.5	3.6	2.9	3.4
Eastern Command	0.9	7.2	2.1	1.4
Southern Command	0.9	10.2	4.3	1.8

Enteric group of fevers.

34. These diseases are fully dealt with in the section of the report on British troops where figures for Indian troops also are given.

Among Indian troops in 1937 the admission rate was 0.9 per 1,000 as compared with 0.7 per 1,000 in 1936, there being actually 10 more cases in 1937 than in 1936.

Out of the total of 88 cases there were nine deaths representing a case mortality of 10.2 per cent. In 1936 there were five deaths in 78 cases giving a case mortality of 6.4 per cent.

The inoculation state of the troops is satisfactory, the figures for the last half yearly inoculation in October being—

TABLE K.

	British officers.	Indian other ranks.	Followers.
Strength	1,790	92,179	20,546
Protected	1,698	91,315	20,511
Unprotected	92	864	35
Protected percentage	94.9	99.1	99.8

There was an interesting little outbreak of typhoid among Indian troops families in Kohat. Nine cases occurred within 2nd May and 15th June. All families were inoculated with T. A. B. vaccine, and the outbreak promptly ceased.

The relative incidence, deaths and case mortality among protected and unprotected I. O. Rs. were—

TABLE L.

	Actuals.		Ratio per 1,000.		Case mortality per cent.
	Cases.	Deaths.	Cases.	Deaths.	
Protected	71	7	0·78	0·08	9·86
Unprotected	17	2	19·68	2·31	11·76

Malaria.

35. There were 9,687 cases of malaria with four deaths in 1937 compared with 14,340 cases and eight deaths in 1936. The ratios per 1,000 during the last five years were—

TABLE M.

	1933.	1934.	1935.	1936.	1937.
Admissions	212·2	156·5	125·9	123·1	97·9
Deaths	0·06	0·05	0·08	0·07	0·04
Invalids	0·05	0·06	0·03	..	..

The following table shows the incidence of the various types of malaria by Commands—

TABLE N.

Commands.	Admissions and deaths.							
	Actuals.				Ratio per 1,000.			
	B. T.	M. T.	Qtn.	Clin.	B. T.	M. T.	Qtn.	Clin.
Northern { A.	2,949	1,252	7	279	67·3	28·6	0·2	6·4
{ D.				1				0·02
Western . { A.	1,382	400	1	76	118·6	34·3	0·1	6·5
{ D.								
Eastern . { A.	1,181	560	6	173	50·0	23·7	0·3	7·3
{ D.		1		1		0·04		0·04
Southern. { A.	774	414	10	92	39·1	20·9	0·5	4·6
{ D.								
All-India { A.	6,286	2,626	24	620	63·6	26·6	0·2	6·3
{ D.		1	..	2		0·01	..	0·02

The stations with an average annual strength of over 1,000 in which malaria admissions exceeded 70 per 1,000 were—

Abbottabad	278·5	Lansdowne	117·9
Fort Sandeman	232·6	Rawalpindi	108·7
Loralai	226·9	Manzai	102·0
Jhelum	175·3	Poona	100·1
Jhansi	163·1	Jubbulpore	91·5
Quetta	156·0	Dehra Dun	89·6
Wana	143·0	Karachi	79·7
Dharamsala	130·0	Bareilly	79·2
Shillong	128·6	Peshawar	86·9
Aurangabad	124·5	Roorkee	78·8
Kohat	122·7	Chaman	75·1
Landikotal	120·9		

The stations with an average strength of over 500 and under 1,000 in which malaria admissions exceeded 70 per 1,000 were—

Shagai	258·6	Midnapore	152·8
Thal	190·4	Dacca	114·2
Malakand	188·7	Mardan	109·6
Ahmedabad	186·1	Mhow	99·9
Fatehgarh	178·6	Nasirabad	83·2

This subject has been dealt with in general in the section of the report referring to British troops.

Pneumonia.

36.

TABLE O.

Years.	Admissions.		Deaths.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1931	1,078	8·7	132	1·06
1932	961	7·9	97	0·80
1933	780	6·2	89	0·76
1934	704	6·0	58	0·49
1935	578	4·9	60	0·51
1936	624	5·4	71	0·61
1937	514	5·2	34	0·34

Of the 514 cases admitted 418 were lobar and 96 lobular in type. The case mortality of the two types were 6·70 and 6·25 per cent. respectively.

The incidence was highest in Eastern Command. Northern Command usually the highest shows a slightly reduced incidence.

An interesting little experiment with a new form of treatment was carried out in Northern Command. It was reported that 20 c.c. of a 25 per cent. solution of rectified spirit in normal saline made with distilled water injected intravenously once daily for 1-2-3 days as necessary had given good results.

This treatment was brought to the notice of medical officers and many cases were so treated. It was then reported that it had been unsatisfactory in three cases. Ninety-one case sheets were then carefully examined, and it was not considered proved that the treatment was responsible for the bad results, while on the other hand many results were strikingly successful. It was therefore decided to leave the question to medical officers' discretion, and review the results again at the end of 1938.

The incidence by Commands was—

	Ratio per 1,000.
Northern Command	6.0
Western	3.0
Eastern	6.7
Southern	3.0

Pyrexia of uncertain origin.

37. Eight cases were included under this head giving a ratio of 0.1 per 1,000.

Small-pox.

38. There were 16 admissions with no deaths giving an admission ratio per 1,000 of 0.2. This is practically the same as in 1936.

Tuberculosis.

39. Pulmonary tuberculosis caused 159 admissions with 12 deaths and 144 invalids giving ratios per 1,000 of 1.6, 0.12 and 1.46 respectively.

There were 35 admissions for tuberculosis of other organs with six deaths and 19 invalids giving ratios per 1,000 of 0.4, 0.06 and 0.19 respectively. Tuberculosis of various abdominal organs produced five admissions.

Venereal Diseases.

40. This group accounted for 812 admissions, giving a ratio per 1,000 of 8.1 which was 1.7 per 1,000 less than in 1936.

TABLE P.

Diseases	Admissions.		Percentage.	
	1936.	1937.	Increase.	Decrease.
Gonorrhœa	561	338	..	39.75
Syphilis	397	300	..	24.43
Soft chancre	181	172	..	4.97

Other diseases due to infection or infestation.

41. There were 4,650 admissions under this heading. The most important diseases in this group were—

Common cold	1,139	Oriental sore.	135
Scabies	761	Ascariasis	101
Mumps	736	Chicken-pox.	82
Influenza	565	Rheumatic fever	75
Ankylostomiasis	416	Intestinal taeniasis	41
Dracontiasis	209	Kala-azar	16
Measles	175	Leprosy	7
Jaundice catarrhal	148	Septicæmia	6

Diseases of the Circulatory System.

42. Circulatory diseases caused 86 admissions to hospital of which the majority were D. A. H. The ratio per 1,000 for admission was 0·9 which was practically the same as in 1936.

There were 11 deaths from this group of diseases giving a ratio per 1,000 of 0·11 against 0·13 in 1936.

Diseases of the Respiratory System.

43. The admissions for diseases of the respiratory system exclusive of pneumonia and tuberculosis, totalled 1,633 giving a ratio of 16·6 per 1,000. Of these 1,245 or 76 per cent. were due to bronchitis. There were six deaths and 33 cases were invalided. The ratio per 1,000 for bronchitis was 12·6 against 11·3 in 1936.

The other important diseases in the group were pleurisy 176, laryngitis 74 and asthma 64.

Diseases of the Digestive System.

44. There were 4,426 admissions for the diseases of the digestive system with nine deaths and 21 invalids, the ratios per 1,000 being admissions 44·9, deaths 0·09 and invalids 0·21, respectively.

The most important diseases in this group were:—

TABLE Q.

	Admissions.	Deaths.	Invalids.
Pharyngitis	1,580	..	..
Tonsillitis	570	..	..
Diarrhoea	535	..	..
Indigestion	401	..	1
Constipation	286	..	..
Hæmorrhoids	166	..	1
Colic	152	..	..
Appendicitis	138	2	3
Gastritis	100	..	..
Hepatitis	51	1	..
Jaundice	44	..	..
Ischio-rectal abscess	41	..	..
Fistula in ano	37	..	2

In addition to the above there were 80 cases of hernia with no death and eight invalids.

Minor Septic Diseases.

45. This group produced 3,105 admissions giving a ratio of 31·4 per 1,000 of strength. Included in the group were :—

Cellulitis	1,978
Boils and carbuncles	531
Abscess	344
Inflammation of lymphatic glands and vessels	137

Local Injuries.

46. There were 5,122 admissions in this group. The ratio per 1,000 was 51·8 compared with 52·6 in 1936.

Followers.

47. The total admissions 6,613 or 279·0 per 1,000 of the strength compared with 279·1 in 1936.

The table below gives figures for certain endemic and infectious diseases amongst followers :—

TABLE R.

Admissions.				Admissions.			
Actuals. Ratio per 1,000.				Actuals. Ratio per 1,000.			
Malaria	1,827	77·1	Influenza	93	3·9		
Bronchitis	469	19·8	Diarrhoea	85	3·6		
Venereal diseases*	252	10·6	Scabies	72	3·0		
Sandfly fever	186	7·8	Pulmonary tuberculosis	37	1·6		
Pneumonia	184	7·8	Dengue	28	1·2		
Dysentery	173	7·3	Enteric group of fevers	17	0·7		
Common cold	170	7·2					

* Gonorrhoea 118, syphilis 85, and soft chancre 49.

There were 94 deaths with a ratio of 3.96 per 1,000 of strength.

The principal causes of deaths were:—

TABLE S.

	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Pneumonia	32	1.35	Pulmonary tuberculosis . .	4	0.17
Infectious diseases	14	0.59	Injuries	4	0.17
Circulatory diseases	13	0.55	Urinary organs diseases . .	3	0.13
Digestive diseases . .	8	0.34	Poisons	3	0.13
Other respiratory diseases	7	0.30			

Sick and wounded labourers treated in Labour Camp Hospital at Quetta during 1937.

Diseases.	Admissions.	Deaths.
Cerebro-spinal fever	..	..
Cholera	..	..
Diphtheria	..	..
Dysentery bacillary	4	..
Dysentery bacillary exudate . .	6	1
Dysentery protozoal	..	..
Dysentery clinical	1	..
Typhoid fever	2	..
Typhoid fever Para "A." . . .	..	..
Typhoid fever Para "B." . . .	..	..
Typhoid fever Para "C." . . .	..	..
Enteric Group	8	1
Malaria	524	2
Oriental sore	28	..
Pneumonia (lobar and lobular) . .	30	10
Smallpox	1	..
Typhus fever	..	..
Local injuries	191	1
All other causes	506	3
TOTAL	1,301	18

Average strength of labourers — 5,713

Ratio per 1,000
of strength.

Admissions (actual)	—1,301	227.6
Average daily sick	—32.92	5.76
Deaths	—18	3.15

Hygiene.

48. The general hygiene of Indian troops lines has improved out of all recognition during the past ten years, and it is seldom that defects under unit control are brought to notice by inspecting hygiene officers. Criticism is mainly concerned with constructional defects, legacies of the past, which are slowly being remedied as funds become available.

Barracks have been steadily improved. Many entirely new barracks have been built. Others have been reconstructed and more are marked down for reconstruction in due course.

For new construction modern fly proofed cookhouses and dining rooms are now outhoused and constructed, as are also fly proofed latrines. Where reconstruction is carried out these are also provided. The majority are however without these amenities, the importance of which in the prevention of disease cannot be overstressed. Unless followers latrines on similar lines are also authorised any improvement in this respect can be only partial.

The possibility of construction of borehole latrines, where the sub-soil water occurs at a suitable depth and where pollution of drinking water can be excluded is not given sufficient importance. They are cheaper and more satisfactory than the present open pan method with all its encumbrances in the way of sweepers, filth carts, incinerators or trenching grounds.

Sanitary demonstration areas for instruction of sanitary orderlies of Indian units in many places need to be constructed or existing areas brought up to date. Training has also in the past been left to individual discretion. It is hoped that this will be more standardised than in the past, by the issue of a syllabus of instruction.

Water supply is the same as for British troops and the introduction of chlorination or chloramination has abolished completely water borne infections, so common many years ago.

The milk supply of Indian units is from Government dairies, and regimental or local dairies. Careful attention is invariably paid to the boiling of the milk, with the result that milk infections among Indian troops are almost negligible. On the other hand a better quality of milk is obtained from the Government dairies and it is hoped that in time all Indian units will be able to obtain their milk from this source.

The introduction of the metal charpoy for Indian troops is a great advance, and these are rapidly replacing the unsightly old wooden charpoys. They are clean and comfortable, and less liable to "bug" infestation. Also, if placed for a few hours in the hot sun, the metal becomes so hot, that both bugs and their eggs are said to be destroyed.

A mosquito net of new pattern with a view to its being more adaptable to "tucking in" under a dhuni, as used by Indian troops on their charpoys in lieu of a mattress, is under consideration of Master General of Ordnance Branch.

Recruiting.

49. The total number of recruits at Recruiting Centres in the year ending the 31st March 1938 was 25,553; of these 9,130 were rejected, a percentage of 35·73.

The principal causes of rejection of recruits for the year ending 31st March 1938 were as follows:—

Disability.	No. of men rejected as unfit for enrolment out of 25,553 presented at recruiting centres only.		No. of recruits found unfit during training out of 11,744 enrolled (10,971 recruits enrolled at recruiting centres and 773 at unit headquarters).	
	Actuals.	Percentage.	Actuals.	Percentage.
1	2	3	4	5
Malaria (enlarged spleen)	617	2·41	4	0·03
Tuberculosis (pulmonary)	147	0·58	4	0·03
Tuberculosis (other organs)	26	0·10	2	0·02
Venereal diseases	389	1·52	6	0·05
Other diseases due to infection	13	0·05	11	0·09
Diseases of the nervous system	9	0·04	22	0·19
Defective vision	489	1·91	5	0·04
Trachoma	1,498	5·86	1	0·01
Other eye affections	205	0·80	11	0·09
Otitis media	669	2·62	..	..
Defective hearing	14	0·05	..	..
Other ear diseases	222	0·87	..	..
Diseases of nose and throat	39	0·15	..	..
Valvular disease of heart	343	1·34	..	..
Disordered action of heart	1,063	4·16	3	0·03
Varicose veins	389	1·52	1	0·01
Hæmorrhoids	276	1·08	..	..
Varicocele	225	0·88	1	0·01
Other diseases of circulatory system	27	0·11	..	..
Anæmia	161	0·63	..	..
Goitre	165	0·65	1	0·01
Respiratory diseases excluding tuberculosis	34	0·13	3	0·03
Pyorrhæa	211	0·83	..	..
Loss or decay of teeth	23	0·09	..	..
Hernia	312	1·22	1	0·01
Other diseases of digestive system	13	0·05	1	0·01
Ankylosis of joints	23	0·09	..	..
Flat feet	86	0·34	3	0·03
Knock knee	97	0·38	3	0·03
Curvature of spine	76	0·30	..	..
Other deformities	202	0·79	1	0·01
Skin diseases	223	0·87	2	0·02
Poor physique	33	0·13	12	0·10
Other causes	811	3·17	79	0·67
Total	9,130	35·73	177	1·51

N. B.—The figures in columns 4 and 5, and in the heading, are in respect of the following only:—Cavalry, Artillery, Sappers and Miners, Indian Signal Units and Infantry.

Military operations in Khaisora Valley (Waziristan) during 1937.

50. *I. Os., I. O. Rs. and Followers.*

Average strength 39,999.

Diseases.	Admissions to hospital.		Deaths.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
All causes	17,618	440.5	121	3.03
Malaria	4,841	121.0	4	0.10
Dysentery	522	13.1	2	0.05
Pneumonia	270	6.8	42	1.05
Minor septic diseases	941	23.5	3	0.03
Digestive diseases	2,001	50.0	5	0.13
Local injuries excluding G. S. W.	2,057	51.4	3	0.08
G. S. Wounds	405	10.1	33	0.83

Anti-rabic treatment, 1937.

51. There are fifty-four local military anti-rabic treatment centres. Military centres have not been opened at those stations in which civil centres already exist. In these stations, military patients are treated at the civil centre. Civilian cases are also treated at military centres where no civilian centre is available. Military centres are located in the following stations:—

B. M. Hs. (32).

Peshawar.	Bangalore.
Rawalpindi.	Madras.
Sialkot.	Wellington.
Lahore.	Malappuram.
Nowshera.	Ranikhet.
Murree.	Meerut.
Nasirabad.	Delhi.
Mhow.	Bareilly.
Jubbulpore.	Jhansi.
Pachmarhi.	Allahabad.
Deolali.	Lucknow.
Bombay (Colaba).	Dinapore.
Ahmednagar.	Calcutta.
Poona.	Agra.
Trimulgherry.	Quetta.
Belgaum.	Karachi.

I. M. Hs. (22).

Abbottabad.	Bombay (I. W.).
Campbellpore.	Cannanore.
Kohat.	Dehra Dun.
Rawalpindi.	Landsdowne.
Razmak.	Dacca.
Bannu.	Calcutta.
Jhelum.	Chittagong.
Sialkot.	Quetta.
Lahore.	Loralai.
Wana.	Fort Sandeman.
Ahmedabad.	Karachi.

Anti-rabic vaccine is obtained from the Pasteur Institute at Kasauli, Shillong, Coonoor, Ballygunge (Calcutta) or from the Haffkine Institute, Bombay. Small stocks of vaccine are maintained at centres to meet emergencies.

Patients are classified according to the classification of the Pasteur Institute, Kasauli.

The following dosage, also advised by the Pasteur Institute, Kasauli, is adopted at all military centres, a five per cent. vaccine being used for the treatment of all classes of cases.

Class I.—2 c.c. daily for 7 days.

Class II.—2 c.c. daily for 14 days.

Class III.—Adults 5 c.c. daily for 14 days.

Children 3·5 c.c. daily for 14 days.

Class IV—

(Extremities)—

Adults 7 c.c. daily for 14 days. ...

Children 5 c.c. daily for 14 days.

(Face)—

Adults 10 c.c. daily for 14 days.

Children 7 c.c. daily for 14 days.

Prophylactic treatments given during 1937.

	British.	Indian.
A. 2 c.c. daily for 7 days	606	197
B. 2 c.c. daily for 14 days	125	67
C. 5 c.c. daily for 14 days	360	82
D. 3·5 c.c. daily for 14 days	19	4
E. 7 c.c. daily for 14 days	44	8
F. 10 c.c. daily for 14 days	34	8
G. 5 c.c. daily for 7 days	21	4
Total	1,209	370

During the year, there were four cases of hydrophobia among British troops and one case among Indian troops.

Two of the cases among British troops had received prophylactic treatment.

Welfare Work Among Indian Troops Families.

52. The extent of this work has been increasing in scope for several years. It is becoming more and more valued by the Indian soldier and is now considered by them as a normal necessity. Questions of caste and religion which at first may have introduced a certain amount of prejudice as regards families making use of these centres are disappearing surprisingly rapidly. The sepoys contribute very willingly towards expenses of the centres, and their subscriptions are supplemented by grants from benevolent funds at Army Headquarters, and from others under Red Cross control. Subscriptions are also raised locally in stations. Both the officers and their wives in the Indian regiments take a very great interest in this work, the latter particularly being all important if a high standard is to be maintained.

Officers commanding Indian Military hospitals generally supervise and give up much of their time to making the centres in their stations a success.

There are in all 18 lady sub-assistant surgeons and one male sub-assistant surgeon employed in this work and paid for from funds controlled by Army Headquarters.

Twelve of the above are paid for by government, and the remaining six lady sub-assistant surgeons and the male sub-assistant surgeon are paid from the Indian expeditionary force canteen profits fund.

That a male sub-assistant surgeon should be employed on this work must seem strange, but he is employed at the special request of the families concerned in Bangalore. It was hoped that four extra lady sub-assistant surgeons would have been authorised in 1939, but owing to financial stringency the measure has had to be postponed for another year. There is no doubt that they are badly needed.

In addition all units in stations employ nurses or health workers, and a civilian lady doctor is frequently employed to supervise the work generally and to treat the more important cases.

Home visiting in the lines is carried out in all centres, and lectures and demonstrations in child welfare and home hygiene are gradually taking a more important place in the work of the centres.

From the figures given below it will be seen that the "treatment" side takes a very important part in this movement. This may not be considered as a true function of a welfare centre, but under the conditions prevailing in the majority of cantonments, it, as far as the army is concerned, cannot be avoided and it is now looked on as a necessity by the Indian soldier. This phase of the work is also extremely useful as it draws the families to the centre, and actually forms the basis on which the real welfare work in its preventive aspect is being gradually built up.

In all 80 centres are now established. Northern Command 22, Southern Command 27, Eastern Command 26, Western Command five.

Centres are mainly established in reappropriated married quarters reconstructed to some extent, but in others such as that at Chaklala, Peshawar, Delhi, Jhansi and Bangalore, buildings and fittings are of a high standard. The equipment is in the great majority suitable for their needs, and, as funds become available annually, improvements from the structural point of view are being carried out. In a few stations small hospitals maintained by local subscriptions exist, and in others a few beds for inpatients, apart from maternity cases, are maintained. Requests for family hospitals are constantly received from the larger stations, but under present conditions of financial stringency higher authority is unable to accept the great financial outlay both initial and recurring which would be necessary to erect, staff and maintain such hospitals. It is also considered that even the construction of these hospitals from private funds is inadvisable except in possibly a few stations, as the military population subscribing to the funds on any large scale must always be of a floating nature, and enthusiasm must perforce also vary with the individuals comprising this population from time to time.

Apart from the actual welfare centres, a movement towards greater amenities for the women and children in Indian units is definitely in progress particularly in depots, where children's play grounds, children's schools, purdah gardens, etc., are rapidly increasing in number.

From the figures quoted in the table of diseases 1937 it will also be seen that this movement is bound to have a most important repercussion to the good on the health of the men of the regiment, particularly from the epidemiological aspect. The presence of ten thousand cases of malaria, two thousand

cases of dysentery, nine thousand eight hundred cases of enteritis and diarrhœa and one hundred and thirty-nine cases of enteric fever apart from cases suffering from air borne infectious complaints annually (mainly unrecognised and untreated in the married lines a few years ago) are bound to be a focus of infection not only to the troops themselves, but to entire stations. The welfare movement has probably played no small part in the reduction in malaria and the enteric group of fevers which has taken place among the Indian troops during the past few years.

Two years ago a *pro forma* was issued to centres asking that daily registers should be compiled each month on the lines of the *pro forma* with a view to the inclusion in the annual report from centres of the numbers of inpatients and outpatients suffering from the more important diseases. Up to this time these facts were an unknown quantity. Figures were received in 1936, but obviously included "attendances" and not individual cases in very many centres. Representations were made on this point and during 1937 it is considered that statistics sufficiently accurate for compilation have been received from centres with the exception of seven. The figures of these latter have been excluded.

The figures are illuminating not only as regards the large numbers treated in certain centres, but, in illustrating the infectious material within close proximity to troops, for which hospital accommodation is usually not available. In view of the high level of general sanitation maintained in military lines, it seems highly probable that they reflect to only a minor extent, similar infections in the bazar populations often in close contact with the troops.

Excluding the seven centres referred to above 71,576 Indian wives were treated as outpatients, and 3,290 as inpatients. Deaths in this group numbered 41. Children outpatients reached the high figure of 75,194 and 3,085 were treated as inpatients. Deaths among children were 349, just over double the number of deaths among the whole of the Indian troops during the year, pneumonia and enteritis being the two main causes.

The large number of malaria cases, women 5,916, children 4,985, totalling 10,901, is interesting in that as the majority are treated with quinine, a large percentage of carriers must remain among them after treatment. All cases would be better treated with a few doses of plasmoquine after quinine treatment is completed, or preferably with atebirin and plasmoquine which have been so successful in reducing the relapse rate among the troops. These cases also indicate what must occur among the families in the followers lines, whose ailments are at the moment largely an unknown quantity.

Three women and four children died from this disease, a small number considering the large number of cases.

The dysentery, diarrhœa and enteritis figures reflect the high incidence of these diseases among the civil population in bazaars. Of the total 2,087 cases of dysentery 1,264 are children, and of the 9,800 cases of enteritis and diarrhœa 7,317 also occurred in children. Until the open pan type of latrine is done away with and more modern sanitation available, this large number of cases in family lines will always remain a potent source of infection not only among the families, but also among the troops. There were 80 children's deaths and three deaths among women from this group of diseases.

Of the 139 cases of enteric fever, 67 were wives and 72 were children, and of the 139 cases, 72 had to be treated in their quarters, a very unsatisfactory arrangement where a disease requiring careful and constant nursing is concerned. Ten cases occurred in a short period among the families in Kohat, but as

the result of all the families being inoculated the small epidemic ceased at once. There is no doubt that all families in unit lines should be inoculated as well as the troops. Nine children and three wives died as the result of this disease. There were 107 deaths among children from pneumonia out of a total of 757 cases, a mortality rate of 14 per cent. This high death rate where children are concerned is probably again due to the fact that 452 were treated in their quarters, and as in the case of the enteric group nursing is the most important part of treatment.

The advent of a drug of the Sulphonamide group (Pyridine), which has recently been placed on the market, may reduce considerably in future this high death rate. There were 273 cases among the wives with three deaths only.

The tuberculosis figures are depressing in that 799 cases were actually diagnosed. If strictly accurate, this figure is probably an underestimate. There were 535 cases reported among the wives as compared with 159 cases among all Indian Other Ranks admitted to hospital for this disease during 1937. The figures from Western Command are however unduly high compared with other commands and should be accepted only with reservation. Children's cases total 255, and again the larger number are from Western Command. There were ten deaths from this disease among the women and six among children.

Confinement cases are carried out in the centres as often as possible. Units vary markedly in this respect. In some the great majority of the cases will willingly come to the Centre for their confinement; others are only persuaded to do so with difficulty. Of the 2,098 confinement cases conducted by welfare workers or nurses during the year, 886 were in Centres and 1,212 in quarters. There was only one death during parturition and four deaths from the after effects of parturition giving a total mortality rate of 0.23 per cent., a highly creditable figure. Diseases of the generative system treated however reach the high figure of 6,352 during the year.

Other respiratory diseases than tubercle and pneumonia, probably bronchitis mainly, total 22,145 of which the vast majority are children among whom there were twelve deaths during the year. Other digestive diseases (none shown by Western Command) also take a prominent place among attendances, 21,309 cases during the year. The figures for women are higher than in the case of children rather unexpectedly but there were five deaths in the latter group.

Diseases of the eye treated were 17,567 of which 10,943 were children, probably in the main.

A little thought given to the general picture presented above must raise many points in the minds of not only hygiene officers, but of all medical officers interested in the general health of their units both as regards soldiers and their families.

As the movement is only in its infancy and based on voluntary efforts we are still very ignorant on many important points. Figures are not available of average strengths of women and children in the lines during the year, and therefore it is difficult to form conclusions as to the incidence of any particular disease. A slip should be attached to each annual report form giving these strengths for each unit concerned in future years. One would like to know whether the dysentery and enteritis incidence at any time was related to a similar incidence among the troops of the units, and what steps were taken with such cases treated in family quarters to prevent the spread of infection in the lines. The type of dysentery, whether bacillary or amoebic,

found among children and adults is equally a matter of the greatest importance from the preventive aspect, quite apart from its great importance for treatment.

Are all malaria cases diagnosed by blood film examination, and what species of parasites were found microscopically? When many cases occur in any unit are spleen indices and blood examinations carried out and is treatment carried out thoroughly with a view to prevention of carriers?

As regards the enteric group of fevers are blood cultures taken? Are stool examinations both during the attack and afterwards for the carrier condition carried out, or are such cases diagnosed only clinically and the question of a possible carrier condition forgotten? This point is obviously of the greatest importance. What are the cases typhoid, paratyphoid, etc.?

As regards "tuberculosis" are such cases diagnosed by demonstration of tubercle bacilli in all cases? What is the disposal of these cases, *e.g.*—Are any arrangements ever made for their treatment in hospitals or sanatoria or do the patients continue to live with their husbands in unit lines, also what arrangements or instructions are given to prevent the spread of infection to their husbands and other children in their own family or to members of other families?

As regards diseases of the eye—How many of these are serious and likely to interfere with vision in the future particularly with respect to cases among children? Are many of the cases early trachoma and if so are they given the benefit of thorough treatment or seen by the Ophthalmic Specialist when necessary?

Points such as the above, which could be raised are legion and a few only are mentioned to point out to Officers Commanding Indian Military Hospitals. (1) That the ailments of families may have an important bearing on the health of the troops. (2) That there is a wide field for what may perhaps be called routine research in a population up to very recently a more or less unknown quantity, but which as compared with any civil population is under very much more control. (3) That medical officers in charge of Indian units should keep a watchful eye on diagnosis, treatment and prevention of spread of infection for such cases as occur in the family lines of the units under their charge.

It is hoped that officers commanding military hospitals will when annual returns from the centres in their stations are being forwarded to Army Headquarters for 1938 send comments also on the figures of the annual return referring to the points mentioned above, and also any other comments which they consider to be of interest for inclusion in the annual report by Deputy Director of Hygiene and Pathology, Army Headquarters, in due course.

This work is only in its infancy at the moment, but is of great importance not only to the Army but from a much wider aspect.

APPENDICES.

SECTION I.

BRITISH TROOPS, 1937.

TABLE A.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M.S. level in feet.	Authority for height.	Points of reference.	Stations.	Height above M.S. level in feet.	Authority for height.	Points of reference.
<i>Northern Com- mand.</i>				<i>Eastern Com- mand.</i>			
Abbottabad . .	4,010	S.D.	Map.	Agra (Fort) . .	525	S.D.	S.B.M.
Ambala . .	902	"	S.B.M.	Allahabad & Fort .	314	"	"
Amritsar . .	754	"	"	Rareilly . .	563	"	"
Bannu . .	1,250	"	Map.	Barrackpore . .	24	"	"
Barlan Camp and Khyragall . .	7,133	I.B.	"	Benares . .	256	"	"
Campbellpore . .	1,180	S.D.	Map.	Cawnpore . .	407	"	B.M.
Cherat . .	4,546	"	"	Chakrata . .	6,385	"	Map.
Dagshai . .	6,087	"	"	Dacca . .	20	M.D.	"
Dalhousie Conva- lescent Depot . .	7,637	"	"	Dehra Dun . .	2,232	S.D.	S.B.M.
Dera Ismail Khan .	568	"	S.B.M.	Delhi . .	757	"	"
Ferozepore . .	649	"	"	Dinapore . .	170	"	Church.
Ghazial . .	6,811	S.G.	"	Fort William . .	17	S.G.	"
Jhelum . .	762	S.D.	"	Fyzabad . .	330	S.D.	S.B.M.
Jullundur Cantt. .	771	"	B.M.	Jhansi . .	849	"	"
Jutogh . .	6,370	"	Map.	Landour Conva- lescent Depot . .	7,528	"	"
Kalabagh & Bara- gall . .	7,963	"	"	Lehong . .	6,000	"	"
Kalabagh & Mari Indus . .	682	"	"	Lucknow Kalubir's Meerut . .	383	"	B.M.
Kasauli Conva- lescent Depot . .	6,050	"	"	Mecrut . .	737	"	S.B.M.
Kohat . .	1,725	"	Map	Muttra . .	560	"	"
Khanpur and Ghora Dhaka . .	7,721	"	"	Port Blair (Tindal- Obay.) . .	9	"	B.M.
Lahore Cantt. and Fort . .	706	"	S.B.M.	Ranikhet . .	5,980	"	"
Landikotal . .	3,509	"	Map.	Roorkee . .	879	S.D.	S.B.M.
Lockhart Fort . .	6,613	"	"	<i>Southern Com- mand.</i>			
Manzal . .	1,650	"	"	Ahmedabad . .	162	S.D.	S.B.M.
Mir Ali . .	2,240	S.G.	V.G.L.	Ahmednagar . .	2,180	"	Map.
Multan . .	404	S.D.	S.B.M.	Bangalore . .	3,002	"	S.B.M.
Murree Conva- lescent Depot . .	7,073	"	Map.	Belgaum . .	2,523	"	"
Nowshera (Rly. Station) . .	966	"	B.M.	Colaba (Bombay Town Hall) . .	20	"	"
Peshawar . .	1,152	"	S.B.M.	Deolali . .	1,894	"	"
Rawalpindi . .	1,689	"	"	Jubbulpore . .	1,320	"	"
Razmak . .	6,556	"	Map.	Kamptee (Rly. Station) . .	940	"	B.M.
Risalpur . .	1,014	"	B.M.	Madras (Obay.) . .	250	"	"
Sialkot . .	829	"	"	Malapuram (Rly. Station) . .	1,380	"	"
Solon . .	5,078	"	"	Mhow . .	1,837	"	"
Sabathu . .	4,000	"	Map.	Mount Abu Sanato- rium . .	3,836	"	"
Thal . .	2,450	"	"	Nasirabad . .	1,461	"	Map.
Wana . .	4,530	S. G.	V. G. L.	Pachmarhi . .	3,490	"	"
<i>Western Com- mand.</i>				Poona . .	1,867	"	S.B.M.
Hyderabad . .	93	S.D.	S.B.M.	Saugor . .	1,755	"	"
Karachi (Holy Tri- nity Church) . .	28	"	"	Secunderabad . .	1,776	"	"
Quetta . .	5,510	"	"	Wellington (Sta. Hospital) . .	5,800	"	Map.

S. D. = Survey Department.
S. B. M. = Standard Bench Mark.
B. M. = G. T. Bench Mark.
S. G. = Surveyor-General of India.
M. D. = Meteorological Department.
V. G. L. = Village ground level.

Map. = Heights taken from Topo. Maps.
I. B. = Intelligence Branch of the Division of
the Chief of the Staff.

TABLE I.

INDIA.

WARRANT OFFICERS, N. C. OS. AND MEN.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Average strength 47,388.								
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.								
Common cold	643	..	..	11.89	13.6	...	..	0.25
Diphtheria	40	..	..	5.05	0.8	0.5	..	0.11
Dysentery	1,209	2	7	58.36	25.5	0.04	0.15	1.23
Enteric fevers (inclusive of typhoid, para. A, B and C and enteric group).	36	4	1	4.93	0.8	0.08	0.02	0.10
Erysipelas	7	..	..	0.25	0.1	..	..	0.01
Influenza	776	..	..	18.40	16.4	..	..	0.39
Malaria	2,111	2	..	80.80	44.5	0.04	..	1.70
Measles	18	..	..	0.87	0.4	..	..	0.02
Meningococcal infection	..	..	..	..	..	..	..	..
Mumps	20	..	..	1.20	0.4	..	..	0.03
Pneumonia	153	9	1	13.96	3.2	0.19	0.02	0.29
Pyrexia of uncertain origin	5	..	..	0.54	0.1	..	..	0.01
Rheumatic fever	68	..	11	9.42	1.4	..	0.23	0.20
Sandfly fever	1,167	..	..	23.08	24.6	..	..	0.49

TABLE I—*contd.*

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Average strength 47,388.								
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION— <i>contd.</i>								
Scarlet fever	1	1	..	0.10	0.0	..	..	0.00
Smallpox	7	1	..	0.56	0.1	0.02	..	0.01
Tuberculosis {	61	1	62	12.24	1.3	0.02	1.31	0.26
	7	..	6	0.55	0.1	..	0.13	0.01
Veneral diseases {	1,345	..	4	178.55	28.4	..	0.08	3.77
Gonorrhea	269	..	..	26.18	5.7	..	..	0.55
Soft chancre	273	..	1	23.72	5.8	..	0.02	0.50
Syphilis	27	..	..	3.10	0.6	..	..	0.07
Other V. D.	990	9	3	38.76	21.1	0.19	0.06	0.82
Other diseases due to infection	64	..	..	2.11	1.4	..	..	0.04
Diseases due to infestation by	..	..	..	..	..	..	..	..
metazoan parasites.	192	..	2	4.24	4.1	..	0.04	0.09
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.								
Diseases of the nervous system	323	5	44	20.81	6.8	0.11	0.93	0.44
Mental diseases	118	..	73	19.49	2.5	..	1.54	1.91
Diseases of the eye	169	..	20	6.68	3.6	..	0.42	0.14
Diseases of the ear and nose	1,148	..	13	34.34	24.2	..	0.27	0.72
Diseases of the heart—	15	..	12	3.07	0.3	..	0.25	0.06
Circulatory system. {	79	1	13	8.63	1.7	0.02	0.27	0.18
Valvular diseases of the heart.	73	5	12	6.90	1.5	0.11	0.25	0.15
Disordered action of the heart.	..	..	..	..	..	..	..	..
Other diseases	..	..	..	..	..	..	..	..

Blood and blood forming organs	248	1	3	16.29	8.2	0.02	0.06	0.34
Ductless or endocrine glands	13	..	3	1.03	0.3	..	0.06	0.02
Breast	16	..	..	0.46	0.3	..	..	0.01
Respiratory system. { Larynx and trachea	61	..	14	1.83	1.3	..	..	0.04
{ Bronchi and bronchioles	815	1	26	41.70	17.2	0.02	0.55	0.88
{ Other diseases	119	2	16	12.30	2.5	0.04	0.32	0.26
Teeth and gums	105	..	..	..	2.2	..	..	0.06
{ Inflammation of tonsils	1,362	..	..	32.71	28.7	..	..	0.69
{ Inflammation of pharynx	381	..	..	7.87	8.0	..	..	0.17
{ Inflammation of stomach	255	..	..	10.81	5.4	..	..	0.23
Digestive system. { Gastric ulcer	26	1	5	3.43	0.5	0.02	0.11	0.07
{ Duodenal ulcer	24	..	7	3.87	0.5	..	0.15	0.08
{ Liver	58	5	4	4.65	1.2	0.06	0.08	0.10
{ Other diseases	2,612	4	22	102.46	55.1	0.08	0.46	2.16
Diseases due to disorders of nutrition or of metabolism	17	1	1	0.64	0.4	0.02	0.02	0.01
Diseases of the:—								
Generative system	695	..	..	35.10	14.7	..	..	0.74
Bones, joints, muscles, fasciæ and bursa	1,191	..	58	62.31	25.1	..	1.22	1.31
Areolar tissue	2,342	..	2	79.48	49.4	..	0.04	1.08
Skin	1,736	..	11	83.54	36.6	..	0.23	1.76
Urinary system	298	7	10	20.61	6.3	0.15	0.21	0.43
Injuries { General	103	23	1	3.18	2.2	0.49	0.02	0.07
{ Local	2,726	18	61	122.26	57.5	0.38	1.29	2.58
{ In action	2	..	..	0.23	0.0	..	..	0.00
Tumours and cysts	118	1	5	5.74	2.5	0.02	0.11	0.12
Poisons	7	1	..	0.17	0.1	0.02	..	0.00
No appreciable disease*	155	..	1	6.08	3.3	..	0.02	0.13
†Suicides	1	7	..	0.01	0.0	0.15	..	0.00
Total	26,908	102	520	1,280.21	567.8	2.15	10.97	27.02

* Includes four cases of malformations and 11 cases of carriers of dysentery, typhoid and diphtheria.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE II.

WARRANT OFFICERS, N. C. Os. AND MEN—contd.

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 13,959.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	140	..	2.45	10.0	..	0.18
Diphtheria	8	..	0.82	0.6	..	0.06
Dysentery	293	1	13.43	21.0	0.07	0.96
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	17	2	1.97	1.2	0.14	0.14
Erysipelas	1	..	0.06	0.1	..	0.00
Influenza	119	..	2.65	8.5	..	0.19
Malaria	636	1	24.81	45.6	0.07	1.78
Measles	1	..	0.00	0.1	..	0.00
Meningococcal infection	..	..	..	..	..	..
Mumps	4	..	0.20	0.3	..	0.01
Pneumonia	59	2	5.38	4.2	0.14	0.39
Pyrexia of uncertain origin	3	..	0.42	0.2	..	0.03
Rheumatic fever	19	..	3.60	1.4	..	0.26
Sandy fever	705	..	13.39	50.5	..	0.96
Scarlet fever	1	..	0.10	0.1	0.07	0.01
Smallpox	2	1	0.11	0.1	..	0.01

Tuberculosis	{ Pulmonary	20	..	2.75	1.4	..	0.20
	{ Other	2	..	0.19	0.1	..	0.01
Venereal diseases	{ Gonorrhoea	401	..	51.64	28.7	..	3.70
	{ Soft chancre	34	..	2.19	2.4	..	0.16
	{ Syphilis	73	..	6.89	5.2	..	0.49
	{ Other V. D.	..	..	..	..	..	..
Other diseases due to infection		153	1	10.25	11.0	0.07	0.73
Diseases due to infestation	{ Scabies	22	..	0.94	1.6	..	0.07
by metazoan parasites.	{ Other diseases.	51	..	1.13	3.7	..	0.08
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.							
Diseases of the nervous system		78	..	3.33	5.6	..	0.24
Mental diseases		28	..	4.50	2.0	..	0.32
Diseases of the eye		46	..	2.10	3.3	..	0.15
Diseases of the ear and nose		334	..	8.53	23.9	..	0.61
Diseases of the { Valvular disease of the heart		4	..	0.59	0.3	..	0.04
circulatory { Disordered action of the heart		22	2	1.17	1.6	0.14	0.08
system. { Other diseases		19	..	1.94	1.4	..	0.14
Diseases of blood and blood forming organs		50	..	3.28	3.6	..	0.23
Diseases of ductless or endocrine glands		4	..	0.29	0.3	..	0.02
Diseases of the breast		6	..	0.20	0.4	..	0.01
Diseases of the { Larynx and trachea		25	..	1.00	1.8	..	0.07
Respiratory { Bronchi and bronchioles		248	..	10.78	17.6	..	0.77
system. { Other diseases		33	.1	3.67	2.4	0.07	0.26
Diseases of the teeth and gums		35	..	1.05	2.5	..	0.08
Inflammation of tonsils		419	..	9.50	30.0	..	0.68
Inflammation of pharynx		133	..	2.56	9.5	..	0.18
Inflammation of stomach		95	..	4.44	6.8	..	0.32
Diseases of the { Gastric ulcer		6	1	0.59	0.4	0.07	0.04
Digestive { Duodenal ulcer		8	..	1.02	0.6	..	0.07
system. { Liver		16	1	1.25	1.1	0.07	0.09
{ Other diseases		731	..	29.13	52.4	..	2.09

TABLE II—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 13,959.						
OTHER DISEASES CLASSIFIED UNDER SYSTEMS— <i>contd.</i>						
Diseases due to disorders of nutrition or of metabolism	2	..	0.16	0.1	..	0.01
Diseases of the generative system	210	..	9.79	15.0	..	0.70
Diseases of bones, joints, muscles, fasciæ and bursæ	442	..	20.91	31.7	..	1.50
Diseases of the areolar tissue	1682	..	18.71	48.9	..	1.84
Diseases of the skin	513	..	24.58	36.8	..	1.76
Diseases of the urinary system	82	1	6.42	5.9	0.07	0.46
Injuries { General	43	11	1.46	8.1	0.79	0.10
Local	793	5	32.79	56.8	0.36	2.35
In action	1	..	0.21	0.1	..	0.03
Tumours and cysts	45	..	2.27	3.2	..	0.16
Poisons	1	..	0.03	0.1	..	0.00
No appreciable disease	49	..	2.11	3.5	..	0.15
*Suicides	..	3	..	..	0.21	..
Total	7,967	30	355.78	570.7	2.15	25.49

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE III.

WARRANT OFFICERS, N. C. Os. AND MEN—contd.

WESTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Average strength 4,008.	Actuals.			Ratio per 1,000.		
		Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Common cold	.	232	..	4.52	57.9	..	1.13
Diphtheria	.	3	..	0.34	0.7	..	0.08
Dysentery	.	112	..	6.78	27.9	..	1.69
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	.	..	..	0.04	..	..	0.01
Erysipelas	.	1	..	0.08	0.2	..	0.01
Influenza	.	5	..	0.16	1.2	..	0.04
Malaria	.	495	..	15.13	123.5	..	3.77
Measles	.	..	..	..	..	..	..
Meningococcal infection	.	..	..	..	..	..	..
Mumps	.	..	..	0.03	..	..	0.01
Pneumonia	.	11	..	1.16	2.7	..	0.29
Pyrexia of uncertain origin	.	..	..	..	..	..	..
Rheumatic fever	.	10	..	1.15	..	..	0.29
Sandfly fever	.	54	..	1.31	2.5	..	0.33
	.				13.5	..	

SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.

TABLE III—*contd.*

Diseases.	Average strength 4,008.	Actuals.			Ratio per 1,000.		
		Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION— <i>contd.</i>							
Scarlet fever	.	..	..	..	..	..	..
Smallpox	.	..	..	..	..	..	..
Tuberculosis	{ Pulmonary	4	..	0.91	1.0	..	0.23
	{ Other	1	..	0.06	0.2	..	0.01
Venereal diseases	{ Gonorrhoea	135	..	17.11	33.7	..	4.27
	{ Soft chancre	15	..	0.98	3.7	..	0.24
	{ Syphilis	17	..	1.42	4.2	..	0.35
	{ Other V. D.	4	..	0.18	1.0	..	0.04
Other diseases due to infection	.	35	..	1.65	8.7	..	0.41
Diseases due to infestation by { Scabies	.	3	..	0.06	0.7	..	0.01
metazoan parasites { Other diseases	.	14	..	0.31	3.5	..	0.08
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.							
Diseases of the nervous system	.	33	1	1.95	8.2	0.25	0.49
Mental diseases	.	15	..	1.71	3.7	..	0.43
Diseases of the :—							
Eye	.	18	..	0.80	4.5	..	0.20
Ear and nose	.	101	..	2.72	25.2	..	0.68
Circulatory	{ Valvular diseases of the heart	1	..	0.09	0.2	..	0.02
system	{ Disordered action of the heart	13	..	0.72	3.2	..	0.18
	{ Other diseases	6	1	0.77	1.5	0.25	0.19
Blood and blood forming organs	.	9	..	0.55	2.2	..	0.14
Ductless or endocrine glands	.	1	..	0.05	0.2	..	0.01
Breast	.	..	..	..	..	..	..
Respiratory system	{ Larynx and trachea.	9	..	0.33	2.2	..	0.08
	{ Bronchi and bronchioles	78	..	3.67	19.5	..	0.92
	{ Other diseases	10	..	1.44	2.5	..	0.36

Diseases of the :—									
Teeth and gums									
	.	.	.	.	15	..	0.49	3.7	0.12
Digestive system	{	Inflammation of tonsils	.	.	107	..	2.76	26.7	0.69
		Inflammation of pharynx	.	.	19	..	0.34	4.7	0.08
		Inflammation of stomach	.	.	37	..	0.71	9.2	0.18
		Gastric ulcer	.	.	4	..	0.62	1.0	0.16
		Duodenal ulcer	.	.	3	..	0.73	0.7	0.18
		Liver	.	.	4	1	0.61	1.0	0.13
		Other diseases	.	.	290	..	11.01	72.4	2.75
Diseases due to the disorders of nutrition or of metabolism									
			.	.	2	..	0.04	0.5	0.01
Diseases of the :—									
Generative system									
Bones, joints, muscles, fasciæ and bursæ	.	.	.	.	62	..	3.23	15.5	0.81
	.	.	.	.	105	..	5.32	26.2	1.33
Areolar tissue	.	.	.	.	171	..	6.36	42.7	1.59
Skin	.	.	.	.	181	..	9.00	45.2	2.25
Urinary system	.	.	.	.	27	2	1.84	6.7	0.46
Injuries	{	General	.	.	11	..	0.18	2.7	0.04
		Local	.	.	242	..	10.37	60.4	2.59
		In action	.	.	..	..	..	..	..
Tumours and cysts	.	.	.	.	10	1	0.61	2.5	0.15
Poisons	.	.	.	.	..	..	..	..	..
No appreciable disease	.	.	.	.	16	..	0.52	4.0	0.13
Suicides	.	.	.	.	..	..	..	..	..
Total					2,751	6	122.77	686.4	30.63

TABLE IV.

WARRANT OFFICERS, N. C. OS. AND MEN—*contd.*

EASTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength, 15,080.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	181	..	3.34	12.0	..	0.22
Diphtheria.	6	..	0.48	0.4	..	0.03
Dysentery	438	1	21.92	29.0	0.07	1.45
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)						
Erysipelas	11	1	1.82	0.7	0.07	0.12
Influenza	389	..	0.06	0.1	..	0.00
			9.68	25.8	..	0.64
Malaria	360	1	16.59	23.9	0.07	1.10
Measles	12	..	0.57	0.8	..	0.04
Meningococcal infection	..	..	..	..	..	..
Mumps	9	..	0.33	0.6	..	0.02
Pneumonia.	37	3	2.79	2.5	0.20	0.19
Pyrexia of uncertain origin	1	..	0.04	0.1	..	0.00
Rheumatic fever	23	..	2.50	1.5	..	0.17
Sandfly fever	337	..	6.86	22.3	..	0.45
Scarlet fever	..	..	..	..	..	..
Small-pox	4	..	0.34	0.3	..	0.02

Tuberculosis { Pulmonary	16	1	3.97	1.1	0.07	0.26
Other	..	..	0.01	..	..	0.00
Venereal diseases { Gonorrhoea	453	..	60.93	30.0	..	4.04
Soft chancre	132	..	13.13	8.8	..	0.87
Syphilis	118	..	10.28	7.8	..	0.68
Other V. D.	22	..	2.83	1.5	..	0.19
Other diseases due to infection	560	3	17.26	37.1	0.20	1.14
Diseases due to infestation { Scabies	16	..	0.54	1.1	..	0.04
by metazoan parasites { Other diseases	67	..	1.49	4.4	..	0.10
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	105	1	6.82	7.0	0.07	0.45
Mental diseases	38	..	5.29	2.5	..	0.35
Diseases of the eye	57	..	2.20	3.8	..	0.15
Diseases of the ear and nose	324	..	9.35	21.5	..	0.62
Diseases of the circulatory system. { Valvular diseases of the heart	2	..	0.22	0.1	..	0.02
{ Disordered action of the heart	16	..	1.22	1.1	..	0.08
{ Other diseases	28	1	3.10	1.9	0.07	0.21
Diseases of the blood and blood forming organs	67	..	3.35	4.4	..	0.22
Diseases of ductless or endocrine glands	8	..	0.69	0.5	..	0.05
Diseases of the breast	6	..	0.11	0.4	..	0.01
Diseases of the respiratory system { Larynx and trachea	23	..	0.43	1.5	..	0.03
{ Bronchi and bronchioles	242	1	7.08	16.0	0.01	0.47
{ Other diseases	45	1	4.24	3.0	0.01	0.28
Diseases of the teeth and gums	27	..	0.49	1.8	..	0.03
{ Inflammation of tonsils	409	..	0.90	27.1	..	0.66
{ Inflammation of pharynx	121	..	2.85	8.0	..	0.19
{ Inflammation of stomach	44	..	1.23	2.9	..	0.08
Diseases of the digestive system. { Gastric ulcer	5	..	0.54	0.3	..	0.04
{ Duodenal ulcer	11	..	1.83	0.7	..	0.12
{ Liver	24	1	1.86	1.6	0.01	0.12
{ Other diseases	874	2	34.43	57.8	0.13	2.28

TABLE IV—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength, 15,080.						
OTHER DISEASES CLASSIFIED UNDER SYSTEMS— <i>contd.</i>						
Diseases due to disorders of nutrition or of metabolism	6	..	0.26	0.4	..	0.02
Diseases of the generative system	191	..	10.73	12.7	..	0.71
Diseases of bones, joints, muscles, fasciæ and bursæ	366	..	20.11	24.3	..	1.33
Diseases of the areolar tissue	763	..	28.69	50.6	..	1.90
Diseases of the skin	538	..	27.43	35.7	..	1.82
Diseases of the urinary system	74	1	4.16	4.9	0.01	0.28
Injuries { General	.24	6	1.04	1.6	0.40	0.07
{ Local	931	5	42.76	61.7	0.33	2.84
{ In action	1	..	0.02	0.1	..	0.00
Tumours and cysts	35	..	1.91	2.3	..	0.13
Poisons	5	1	0.12	0.3	0.01	0.01
No appreciable disease	30	..	0.80	2.0	..	0.05
*Suicides	1	2	0.01	0.1	0.13	0.00
Total	8,631	30	413.08	572.3	1.99	27.39

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE V.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

SOUTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 14,341.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	.	.	.	.	.	0.11
Diphtheria	.	.	.	.	.	0.24
Dysentery	.	.	.	.	.	1.13
	90	..	1.58	6.3	..	
	23	..	3.41	1.6	..	
	366	..	16.23	25.5	..	
Enteric fever (inclusive of Typhoid, Para. A, B and C and enteric group).	8	1	1.10	0.6	0.07	0.08
Erysipelas	3	..	0.10	0.2	..	0.01
Influenza	263	..	5.91	18.3	..	0.41
Malaria	620	..	24.27	43.2	..	1.69
Measles	5	..	0.30	0.3	..	0.02
Meningococcal infection	..	..	..	..	..	..
Mumps	7	..	0.64	0.5	..	0.04
Pneumonia	46	4	4.63	3.2	0.28	0.32

TABLE V—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION— <i>contd.</i>						
Average strength 14,341.						
Pyrexia of uncertain origin	1	..	0.08	0.1	..	0.01
Rheumatic fever	16	..	2.17	1.1	..	0.16
Sandfly fever	71	..	1.52	5.0	..	0.11
Scarlet fever	..	..	..	..	..	..
Smallpox	1	..	0.11	0.1	..	0.01
Tuberculosis { Pulmonary	21	..	4.61	1.5	..	0.32
{ Other	4	..	0.29	0.3	..	0.02
Venereal diseases { Gonorrhœa	356	..	48.87	24.8	..	3.41
{ Soft chancre	88	..	9.88	6.1	..	0.69
{ Syphilis	65	..	5.13	4.5	..	0.36
{ Other V. D.	1	..	0.09	0.1	..	0.01
Other diseases due to infection	251	5	9.60	17.5	0.35	0.67
Diseases due to { Scabies	23	..	0.57	1.6	..	0.04
infestation by { metazoan para-	..	..	..	..	..	..
sites. { Other diseases	60	..	1.31	4.2	..	0.09
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	107	3	8.71	7.5	0.21	0.61
Mental diseases	37	..	7.99	2.6	..	0.56

Diseases of the eye	48	1.68	3.3	0.11
Diseases of the ear and nose	389	13.69	27.1	0.95
Diseases of the { Valvular disease of the heart	8	2.17	0.6	0.15
circulatory { Disordered action of the heart	28	5.52	2.0	0.38
system. { Other diseases	20	1.03	1.4	0.07
Diseases of the blood and blood forming organs	122	9.11	8.5	0.64
Diseases of ductless or endocrine glands	..	..	..	..
Diseases of the breast	4	0.15	0.3	0.01
Diseases of the { Larynx and trachea	4	0.07	0.3	0.00
respiratory { Bronchi and bronchioles	247	20.17	17.2	1.41
system. { Other diseases	31	2.95	2.2	0.21
Diseases of the teeth and gums	28	0.65	2.0	0.05
{ Inflammation of tonsils	427	10.55	29.8	0.74
{ Inflammation of pharynx	108	2.12	7.5	0.15
{ Inflammation of stomach	79	4.43	5.5	0.31
Diseases of the { Gastric ulcer	11	1.68	0.8	0.12
digestive { Duodenal ulcer	2	0.29	0.1	0.02
system. { Liver	14	1.03	1.0	0.07
{ Other diseases	720	27.89	50.2	1.94
Diseases due to disorders of nutrition or of metabolism	7	0.18	0.5	0.01
Diseases of the generative system	232	11.35	16.2	0.79
Diseases of bones, joints, muscles, fasciæ and bursæ	278	15.97	19.4	1.11
Diseases of the areolar tissue	726	25.72	50.6	1.79
Diseases of the skin	504	22.53	35.1	1.57
Diseases of the urinary system	115	8.19	8.0	0.57
Injuries { General	25	0.50	1.7	0.03
{ Local	560	36.34	53.0	2.53
{ In action	..	..	..	..

TABLE V—*concd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 14,341.						
OTHER DISEASES CLASSIFIED UNDER SYSTEMS— <i>concd.</i>						
Tumours and cysts	28	..	0.95	2.0	..	0.07
Poisons	1	..	0.02	0.1	..	0.00
No appreciable disease	60	..	2.65	4.2	..	0.18
*Suicides.	..	3	..	..	0.14	..
Total	7,559	38	388.58	527.1	2.51	27.10

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE VI.

BRITISH OTHER RANKS.

Table showing monthly ratios per 1,000 of the strength of admissions for certain diseases for all-India during the year 1937.

1937.	Enteric group of fevers.	Influenza.	Cholera.	Small pox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudate.	Dysentery group.	Pyloric of uncertain origin.	Pneumonia (lobar and lobular).	Diarrhoea.	Dengue.	Sandy fever.	Plague.	Effects of heat.	All causes.
January	0.0	1.6	..	..	1.3	0.1	0.2	0.4	0.2	0.0	0.4	0.3	0.1	0.1	..	..	42.5
February	0.1	2.9	..	0.0	1.0	0.2	0.2	0.3	0.1	0.0	0.3	0.7	0.0	0.0	..	..	34.6
March	..	1.6	..	0.0	1.1	0.2	1.1	0.4	0.4	..	0.3	1.3	0.4	0.6	..	..	37.1
April	..	0.5	0.0	0.0	1.3	0.4	1.6	0.7	0.3	0.0	0.2	3.0	0.3	2.2	..	0.0	45.5
May	0.1	2.1	..	0.0	2.0	0.3	1.4	0.5	0.3	0.1	0.4	2.1	0.6	3.6	..	0.1	50.5
June	0.1	0.7	..	..	2.5	0.2	0.3	0.3	0.4	0.0	0.3	1.1	0.2	4.3	..	0.6	50.1
July	0.0	2.1	..	..	3.6	0.2	1.1	0.6	0.4	..	0.1	1.3	0.6	5.6	..	0.2	57.0
August	0.1	0.6	..	0.0	7.6	0.3	1.3	0.5	0.3	..	0.2	2.2	1.4	4.0	..	0.3	61.0
September	0.1	1.3	..	0.0	9.5	0.2	1.3	0.3	0.6	..	0.2	1.2	4.6	2.3	..	0.0	57.4
October	..	0.9	..	..	7.3	0.1	0.3	0.4	0.3	..	0.2	0.6	2.9	1.2	..	0.0	49.4
November	..	1.0	..	0.0	5.2	0.3	1.1	0.7	0.7	..	0.2	1.1	1.6	0.4	..	0.0	44.9
December	..	0.5	..	0.0	2.9	0.2	1.2	0.3	0.2	..	0.4	0.6	0.4	0.1	..	0.0	37.2
Total	0.8	16.2	0.0	0.1	44.4	2.6	12.4	5.1	5.6	0.2	3.0	10.1	13.2	24.6	..	1.0	567.1

TABLE

BRITISH

Table showing ratios per 1,000 of strength of admissions for certain India

Stations and districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Paratyphoid A.	Paratyphoid B.	Paratyphoid C.	Enteric group.	Bacillary Dysentery.	Bacillary Dysentery.	Protozoal.	Clinical.
Gherat	390	..	..	..	..	..	..	2.6	..	2.6
Landkotal	742	..	..	..	..	..	4.0	..	..	1.3
Nowshera	982	..	..	..	..	1.0	6.1	1.0	..	12.2
Peshawar	1,274	..	..	0.8	..	0.8	29.0	5.5	0.8	9.4
Risalpur	682	..	..	..	..	..	1.5	..	..	..
<i>Peshawar District</i>	4,070	..	..	0.2	..	0.5	11.5	2.2	0.2	6.4
Kohat	160	..	..	..	..	..	..	..	..	..
Fort Lockhart	7	..	..	..	..	..	..	..	..	..
Thall	5	..	..	..	..	..	..	..	..	..
<i>Kohat District</i>	172	..	..	..	..	..	..	..	..	..
Abbottabad	115	..	..	..	..	..	8.7	8.7	8.7	8.7
Barian	191	5.2	..	..	..	..	10.5	..	..	10.5
Campbellpore	126	..	..	..	..	..	..	7.9	..	..
Ghazal	91	..	..	..	..	..	11.0	..	..	..
Jhelum	7	..	..	..	..	..	142.9	..	..	..
Khanaspur	180	..	..	..	..	..	5.6	..	..	..
Murree	227	..	..	..	..	..	13.2	..	8.8	4.4
Rawalpindi	1,982	..	..	..	..	..	6.1	2.5	4.0	5.5
<i>Rawalpindi District</i>	2,919	0.3	..	..	..	..	7.2	2.4	3.8	5.1
Ambala	654	..	..	..	..	1.5	6.1	..	4.6	9.2
Dagbhal	880	..	..	..	..	..	13.2	7.9	5.3	7.9
Amritsar	172	..	5.8	..	..	..	17.4	..	11.6	..
Dalhousie	452	..	..	..	..	..	37.6	19.9	..	17.7
Ferozepore	805	..	..	..	..	2.5	..	..	1.2	33.5
Jullundur	600	..	..	..	..	1.7	8.3	1.7	..	21.7
Jutogh	163	..	..	..	..	..	..	6.1	..	..
Kasauli	222	..	..	..	..	13.5	18.0	9.0	..	13.5
Lahore	980	..	..	..	..	2.0	4.1	4.1	1.0	6.1
Multan	548	1.8	..	..	..	..	5.5	9.1	..	..
Subathu	166	..	..	..	..	..	..	..	..	..
Siakot	1,245	..	..	..	..	2.4	4.8	4.8	2.4	2.4
Solon	138	..	..	..	..	..	7.2	..	..	..
<i>Lahore District</i>	6,525	0.2	0.2	..	..	1.8	7.5	4.3	1.8	10.6

VII.

OTHER RANKS.

diseases and constantly sick for all causes in each station and district in during 1937.

Diarrhoea.	Cholera.	Veneral diseases.	Smallpox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (lobar and lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
20.5	..	17.9	..	46.2	..	48.7	..	..	5.1	..	..	535.9	16.87
14.8	..	22.9	..	21.6	..	98.4	..	..	1.3	..	1.8	547.2	14.89
38.7	..	36.7	1.0	42.8	..	86.6	..	11.2	9.2	..	3.1	604.9	26.18.
13.3	..	39.2	..	81.6	..	179.7	..	0.8	3.9	0.8	3.1	900.3	41.82.
22.0	..	1.5	..	26.4	..	33.7	..	..	4.4	..	2.9	318.2	7.35
21.9	..	27.3	0.2	43.6	..	105.4	..	2.9	4.9	0.2	2.5	632.2	24.91
50.0	..	12.5	..	25.0	..	56.3	..	50.0	6.3	..	..	543.8	14.81
..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..
46.5	..	11.6	..	23.3	..	52.3	..	46.5	5.8	..	..	505.8	13.78
8.7	..	17.4	..	408.7	..	26.1	..	..	..	..	..	687.0	17.22
5.2	..	52.4	..	141.4	..	26.2	..	..	..	..	..	481.7	42.67
7.9	..	23.8	..	23.8	..	7.9	..	7.9	..	..	..	325.4	11.27
..	..	..	..	54.9	..	..	..	..	..	..	..	175.8	4.29
..	..	..	..	..	..	..	..	..	..	..	..	235.7	2.86
11.1	..	5.6	..	83.3	..	..	..	..	5.6	..	..	550.0	16.89
17.6	..	4.4	..	79.3	..	4.4	..	..	..	..	..	502.2	58.41
5.5	..	30.8	..	66.6	..	43.9	..	13.1	5.5	..	2.0	502.0	22.10
6.9	..	26.7	..	84.6	..	36.7	..	9.2	4.1	..	1.4	492.6	24.69
4.6	..	87.2	..	24.5	..	30.6	..	..	3.1	..	..	607.0	39.22
13.2	..	115.8	..	15.8	..	21.1	..	..	2.6	..	..	497.4	17.97
17.4	..	64.0	..	23.3	..	29.1	..	5.8	..	..	11.6	668.6	27.21
11.1	..	15.5	..	35.4	..	..	..	26.5	2.2	..	..	488.9	31.44
24.8	..	36.0	..	37.3	..	31.1	..	..	11.2	1.2	1.2	713.0	22.71
18.3	..	48.8	..	11.7	1.7	23.3	..	..	..	1.7	5.0	553.3	21.88
30.7	..	36.8	..	12.3	..	..	..	..	..	..	..	429.4	16.20
22.5	..	22.5	..	31.5	..	22.5	..	9.0	..	..	..	1013.5	60.59
8.2	..	78.6	..	16.3	..	8.2	..	6.1	2.0	1.0	1.0	492.9	32.43
5.5	..	29.2	1.8	116.8	3.6	80.8	..	..	3.6	..	..	625.9	26.51
..	..	..	..	..	..	..	..	..	..	..	..	..	..
27.8	..	24.9	..	0.8	..	24.1	..	37.8	3.2	2.4	1.6	530.1	19.87
21.7	..	14.5	..	14.5	..	..	..	..	7.2	..	..	239.1	7.08
16.1	..	48.1	0.2	26.2	0.5	24.4	..	10.4	3.4	0.9	1.4	558.1	26.09

TABLE

Stations and districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary bact.	Bacillary exudate.	Protozoal.	Clinical.
Bannu	18	::	::	::	::	::	::	:	56·6	::
Dera Ismail Khan	27	::	::	::	::	::	::	:	.	::
Mankai	5	::	::	::	::	::	::	:	.	::
Razmak	201	::	::	::	::	::	::	:	5·0	::
Wana	20	::	::	::	::	::	::	:	.	::
<i>Waziristan District</i>	271	::	::	::	::	::	::	:	7·4	::
Quetta	1,561	::	::	::	::	::	16·0	4·5	0·6	9·0
<i>Baluchistan District</i>	1,561	::	::	::	::	::	16·0	4·5	0·6	9·0
Hyderabad	549	0·5	::	::	::	::	7·3	12·8	1·8	14·6
Karachi	1,898	0·5	::	::	::	::	10·0	5·8	1·6	7·4
<i>Sind Bds. Area</i>	2,447	0·4	::	::	::	::	9·4	7·4	1·6	9·0
Bareilly	729	::	::	::	::	1·4	23·3	2·7	4·1	::
Unakrata	759	::	::	::	::	::	2·6	.	.	.
Dehra Dun	351	::	::	::	::	::	5·7	2·8	2·8	2·8
Jhansi	907	1·1	::	::	::	::	36·4	3·3	13·2	3·3
Landour	30	::	0·6	::	::	0·6	30·9	11·9	3·0	::
Meerut	1,683	::	0·6	::	::	0·6	8·4	8·4	.	::
Roorkee	119	::	0·6	::	::	0·6	8·4	8·4	.	::
<i>Meerut District</i>	4,578	0·2	0·2	::	::	0·4	23·4	5·9	4·6	0·9
Allahabad	813	::	::	::	::	1·2	24·6	.	7·4	17·2
Bonares	137	::	::	::	::	::	6·0	14·6	.	8·9
Gawnpore	671	::	::	::	::	::	.	.	.	.
Fyzabad	750	::	::	::	::	::	12·0	1·3	.	9·3
Lucknow	2,419	::	::	::	::	::	16·1	3·3	3·8	9·5
Hanikhet	1,114	0·9	::	0·9	::	::	16·2	0·9	4·6	13·6
<i>Lucknow District</i>	5,904	0·2	::	0·2	::	0·2	15·2	2·0	3·2	11·0
Calcutta	965	::	::	::	::	1·0	9·3	6·2	6·2	1·0
Barrackpore	472	::	::	::	::	.	4·2	2·1	8·5	2·1
Dinapore	549	::	::	::	::	.	20·0	3·6	.	14·6
Lehong	493	::	::	::	::	6·1	.	4·1	.	2·0
Dacca	11	::	::	::	::	.	.	.	.	.
Port Blair	122	::	::	::	::	8·2	.	.	8·2	.
<i>P. & A. District</i>	2,612	::	::	::	::	1·9	8·4	4·2	4·2	4·2
Agra	751	::	::	::	::	.	8·0	6·7	1·3	.
Delhi	964	::	::	::	::	.	10·4	9·3	1·0	1·0
Muttra	271	::	::	::	::	.	3·7	.	.	14·3
<i>Delhi Ind. Bds.</i>	1,986	::	::	::	::	.	8·6	7·0	1·0	2·5
Ahmednagar	950	0·7	::	::	::	1·1	7·4	10·5	2·1	.
Jubbulpore	1,879	0·7	::	::	::	.	11·6	4·4	2·2	3·6
Kamptee	637	::	::	::	::	1·6	9·4	7·8	1·6	3·1
Secunderabad	2,546	::	::	::	::	.	19·2	3·1	2·4	3·6
Pachmarhi	56	::	::	::	::	.	.	.	.	17·9
Baugor	21	::	::	::	::	.	.	.	.	.

VII—contd.

Diarrhoea.	Cholera.	Veneral diseases	Smallpox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia (lobar and lobular).	Heat-stroke.	Heat-exhaustion.	All causes.	Average annual number constantly sick.
..	..	..	..	74.1	..	55.6	..	..	..	..	..	611.1	30.00
..	200.0	..	..	..	..	..	..	..	..	..	..	148.1	4.44
5.0	..	19.9	..	10.0	..	..	..	..	..	..	..	600.0	16.00
..	..	..	..	50.0	..	..	..	..	..	..	..	587.1	30.85
..	..	..	..	..	..	..	..	..	..	..	..	450.0	7.50
3.7	..	18.5	..	18.5	..	3.7	..	..	..	..	..	535.1	26.16
39.7	..	32.0	..	194.7	..	3.8	..	3.2	2.6	..	0.6	818.7	31.89
39.7	..	32.0	..	194.7	..	3.8	..	3.2	2.6	..	0.6	818.7	31.89
31.0	..	43.7	..	103.8	3.6	10.9	..	..	5.5	..	..	755.9	23.88
21.1	..	50.1	..	71.7	..	22.1	..	..	1.1	..	..	582.2	30.34
23.3	..	48.6	..	78.9	0.8	19.6	..	..	2.0	..	..	605.6	28.89
8.2	..	43.9	..	37.0	..	43.9	..	2.7	1.4	..	..	585.7	31.73
30.3	..	30.3	1.3	14.5	..	..	..	11.9	1.3	..	..	438.7	19.34
14.2	..	39.9	..	..	..	..	..	8.5	2.8	..	..	484.3	15.41
35.3	..	40.8	..	73.9	..	..	..	33.1	5.5	2.2	..	744.2	29.78
30.3	..	31.3	..	33.3	..	..	..	69.5	1.2	1.2	..	533.3	9.33
..	..	26.1	..	26.1	27.9	..	..	..	..	..	..	707.7	39.83
..	..	33.6	..	33.6	..	..	..	..	..	..	..	428.6	7.90
25.6	..	33.9	0.2	33.6	10.3	7.0	..	35.2	2.2	0.9	..	825.4	30.25
24.6	..	29.5	..	22.1	..	35.7	..	8.6	1.2	..	1.2	587.9	26.84
58.4	..	36.5	..	..	..	116.8	..	7.8	..	7.3	..	905.1	30.66
13.4	..	44.7	..	25.3	1.5	28.3	..	3.0	3.0	..	..	526.1	21.03
20.0	..	21.3	..	10.7	..	41.3	..	24.0	4.0	..	..	426.7	16.60
26.9	..	34.7	..	10.7	..	74.0	..	23.6	0.8	..	..	535.3	25.91
6.3	..	9.0	..	7.2	..	..	..	44.9	0.9	..	..	402.2	30.73
21.0	..	28.6	..	13.0	0.2	46.4	..	22.9	1.5	0.2	0.2	511.3	25.32
6.2	..	135.8	..	16.6	339.6	3.1	..	12.4	1.0	..	..	899.5	26.64
..	..	183.6	..	25.4	10.6	..	..	2.1	..	..	..	508.5	68.41
1.8	..	60.1	..	7.3	1.8	7.3	..	1.8	3.6	..	..	478.1	20.00
12.2	..	60.7	..	23.4	2.0	..	..	24.3	..	..	..	316.4	10.89
..	..	16.4	..	90.9	..	..	..	..	..	..	..	90.9	1.22
..	..	..	..	16.4	..	8.2	..	..	..	..	..	329.5	9.92
5.0	..	107.2	..	18.8	146.6	3.1	..	10.0	1.1	..	..	595.8	28.94
6.7	..	46.6	4.0	23.3	..	8.0	..	16.0	1.3	1.3	1.3	460.7	22.52
21.8	..	39.4	..	52.9	2.1	14.5	..	55.0	8.3	..	..	675.3	26.78
7.4	3.7	40.6	..	51.7	..	7.4	..	3.7	3.7	..	..	671.6	27.71
44.1	0.5	42.3	1.5	42.3	1.0	11.1	..	33.2	5.0	0.5	0.5	593.7	25.30
4.2	..	35.8	..	24.2	5.3	14.7	..	..	1.1	..	..	353.7	6.97
14.5	..	41.7	..	84.8	..	..	..	6.5	2.2	..	3.6	532.3	29.33
6.3	..	38.0	1.6	83.2	1.6	15.7	..	34.5	3.1	..	..	530.6	17.99
9.4	..	38.4	..	12.6	0.4	9.8	..	0.4	5.9	..	0.8	510.6	25.09
..	..	17.9	..	821.4	..	..	..	..	..	..	..	446.4	8.57
..	..	..	..	95.2	..	..	..	..	..	..	..	333.3	2.86

TABLE

Stations and districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary bact.	Bacillary exudate.	Protozoal.	Clinical.
<i>Deccan District</i>	5,589	0.2	...	...	...	0.4	14.0	5.2	2.1	3.0
Mhow	1,450	...	...	...	...	...	4.8	5.5	4.8	2.8
Mount Abu	91	...	...	...	...	...	38.0	...	...	22.0
Nasirabad	674	...	...	...	...	...	18.4	10.4	3.0	3.0
Ahmedabad	150	6.7	6.7	...	...	...	6.7	26.7	...	13.8
Oolaba	842	...	...	...	...	1.2	1.2	2.4	1.2	...
Deolali	283	...	...	...	...	...	...	3.5	...	...
<i>Bombay District</i>	3,490	0.3	0.3	...	...	0.3	6.0	6.8	2.9	2.9
Belgaum	75	...	...	...	...	...	...	13.8	...	...
Poona	2,435	...	...	0.4	...	0.8	22.2	12.8	0.4	2.9
<i>Poona Bds. Area</i>	2,510	...	...	0.4	...	0.8	21.5	12.4	0.4	2.8
Bangalore	1,048	...	...	...	...	...	21.9	6.7	5.7	...
Madras	771	...	...	...	...	...	9.1	13.0	7.8	...
Malapurum	142	...	...	...	...	...	...	...	...	...
Wellington	791	...	...	...	...	...	3.8	11.4	5.1	...
<i>Madras District</i>	2,752	...	...	...	...	...	12.0	9.4	5.8	...
INDIA	47,888	0.1	0.1	0.1	...	0.6	12.4	5.1	2.6	5.6

VII—concl'd.

Diarrhea.	Cholera.	Veneral diseases.	Smallpox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia (lobar and lobular).	Heat-stroke.	Heat-exhaustion.	All causes.	Average annual number constantly sick.
9.3	...	36.5	0.2	43.8	1.3	8.8	...	5.7	3.8	...	1.3	490.2	21.99
17.2	...	14.5	...	90.3	...	...	...	23.4	4.8	...	...	591.0	25.91
22.0	...	22.0	...	33.0	...	...	...	...	...	...	...	538.5	12.42
8.9	...	23.7	...	71.2	...	23.2	...	11.9	...	...	...	486.6	16.57
6.7	...	6.7	...	153.3	46.7	...	...	...	6.7	...	6.7	840.0	23.27
16.6	...	51.1	...	20.2	...	...	...	57.0	2.4	...	...	673.4	34.61
...	...	38.9	...	81.3	...	...	...	7.1	...	...	...	621.9	16.36
13.8	...	26.9	...	70.2	2.0	5.4	...	26.4	2.9	...	0.3	602.6	24.97
13.3	...	...	...	...	...	...	...	13.3	13.3	...	...	386.7	9.73
9.0	...	32.4	...	45.6	...	...	...	17.7	4.1	...	...	523.1	39.92
9.2	...	31.5	...	44.2	...	...	...	17.5	4.4	...	...	523.9	39.02
7.6	...	42.0	...	9.5	21.9	1.9	...	1.9	...	...	...	450.4	27.07
3.9	...	73.9	...	7.8	123.4	1.3	...	1.3	...	...	...	758.2	31.17
...	...	70.4	...	...	...	...	...	...	...	...	7.0	605.6	23.10
6.3	...	35.4	...	3.8	6.8	...	...	...	1.3	...	...	336.3	19.01
5.8	...	50.5	...	6.9	46.1	1.1	...	1.1	0.4	...	0.4	511.3	25.96
16.1	0.0	39.7	0.1	44.4	12.2	24.6	...	16.2	3.0	0.3	0.7	567.1	26.73

TABLE VIII.

BRITISH OFFICERS (BRITISH SERVICE).

ALL INDIA.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Average number constantly sick.	Ratio per 1,000.		
	Admissions.	Deaths.	Admissions.		Deaths.	Constantly sick.	
Average strength			2,055.				
<i>Specific diseases due to infection or infestation.</i>							
Common cold	25	—	0·37	12·2	..	0·18	
Diphtheria	5	..	0·49	2·4	..	0·24	
Dysentery	64	..	2·63	31·1	..	1·23	
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	4	1	0·55	1·9	0·49	0·27	
Erysipelas	2	..	0·06	1·0	..	0·03	
Influenza	33	..	0·61	16·1	..	0·30	
Malaria	54	..	1·59	26·3	..	0·77	
Measles	1	..	0·07	0·5	..	0·03	
Meningococcal infection	..	..	..	..	..	..	
Mumps	1	..	0·05	0·5	..	0·02	
Pneumonia	3	..	0·23	1·5	..	0·11	
Pyrexia of uncertain origin	2	..	0·11	1·0	..	0·05	
Rheumatic fever	1	..	0·18	9·5	..	0·09	
Sandy fever	59	..	0·88	27·3	..	0·43	
Scarlet fever	1	..	0·27	0·5	..	0·13	
Smallpox	..	..	..	..	..	..	
Pulmonary Tuberculosis {	2	..	0·12	1·0	..	0·06	
Other	..	..	..	..	..	..	
Veneral diseases {	1	..	0·08	0·5	..	0·04	
Gonorrhoea	..	..	..	..	..	..	
Soft chancre	..	..	..	..	..	..	
Syphilis	..	..	..	..	..	..	
Other V. D.	..	..	..	..	..	..	

Other diseases due to infection	..	79	..	2.82	38.4	..	1.37
Diseases due to Infestation by metazoan parasites.	..	..	..	..	..	..	..
Other diseases	..	10	..	0.20	4.9	..	0.10
<i>Other diseases classified under systems.</i>							
Diseases of the nervous system	..	18	..	2.12	8.8	..	0.55
Mental diseases	..	4	..	0.29	1.9	..	0.14
Diseases of the —	..	3	..	0.15	1.5	..	0.07
Eye	..	37	..	0.95	18.0	..	0.46
Ear and nose	..	..	..	..	..	..	..
Diseases of the — { Valvular disease of the heart	..	..	..	..	..	..	..
circulatory	..	..	..	0.06	1.5	..	0.03
{ Disordered action of the heart	..	3	..	..	..	..	..
{ Other diseases	..	5	..	0.08	2.4	..	0.04
Diseases of the blood and blood forming organs	..	..	..	..	..	..	..
Diseases of ductless or endocrine glands	..	..	..	..	..	..	..
Diseases of the breast	..	..	..	..	..	..	..
Diseases of the { Larynx and trachea	..	3	..	0.03	1.5	..	0.01
respiratory	..	12	..	0.24	5.8	..	0.12
{ Bronchi and bronchioles	..	6	..	0.50	2.9	..	0.24
{ Other diseases	..	..	..	..	..	..	..
Diseases of the teeth and gums	..	3	..	0.04	1.5	..	0.02
{ Inflammation of tonsils	..	43	..	0.85	20.9	..	0.41
{ Inflammation of pharynx	..	13	..	0.30	6.3	..	0.15
{ Inflammation of stomach	..	14	..	0.21	6.8	..	0.10
Diseases of the digestive system.	..	1	..	0.07	0.6	..	0.03
{ Gastric ulcer	..	3	..	0.11	1.5	..	0.05
{ Duodenal ulcer	..	8	..	0.63	6.3	0.49	0.31
{ Liver	..	13	..	3.83	60.8	..	1.93
{ Other diseases	..	125	..	..	..	..	..
Diseases due to disorders of nutrition or of metabolism	..	..	..	0.14	0.5	..	0.07
Diseases of the generative system	..	28	..	0.87	13.6	..	0.42
Diseases of bones, joints, muscles, fascia and bursae	..	..	..	..	..	..	..
Diseases of the articular tissue	..	53	..	1.25	25.8	..	0.61
Diseases of the skin	..	7	..	0.35	3.4	..	0.17
Diseases of the urinary system	..	13	..	0.57	6.3	..	0.28
Injuries { General	..	6	..	0.14	2.9	..	0.07
{ Local	..	98	..	3.66	47.7	1.95	1.78
{ In action	..	1	..	0.09	0.5	..	0.04
Tumours and cysts	..	5	1	0.07	2.4	0.49	0.03
Poisons	..	1	..	0.02	0.5	..	0.01
No appreciable disease	..	2	..	0.06	1.0	..	0.03
Suicides	..	..	..	..	..	..	..
Total	..	865	7	27.99	420.9	3.41	13.62

TABLE IX.

WIVES OF WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength . . . 4,148.						
Specific diseases due to infection or infestation.						
Common cold	14	...	0.22	3.4	...	0.05
Diphtheria	3	...	0.37	0.7	...	0.09
Dysentery	59	...	1.80	14.2	...	0.43
Enteric fever (Inclusive of typhoid, para. A, B and C, and enteric group).	1	..	0.10	0.2	...	0.02
Erysipelas	2	...	0.05	0.5	..	0.01
Influenza	19	...	0.38	4.6	...	0.09
Malaria	77	...	1.97	18.6	...	0.47
Measles	1	...	0.01	0.2	...	0.00
Meningococcal infection	...	...	...	...	...	...
Mumps	7	1	0.42	1.7	0.24	0.10
Pneumonia	...	...	...	...	...	..
Pyrexia of uncertain origin	...	...	...	...	...	...
Rheumatic fever	2	...	0.04	0.5	...	0.01
Sandfly fever	9	...	0.12	2.2	...	0.03
Scarlet fever.	2	...	0.09	0.5	...	0.02
Smallpox	2	1	0.11	0.5	0.24	0.03
Tuberculosis { Pulmonary	6	1	0.61	1.4	0.24	0.15
Other	...	...	...	...	...	...
Veneral diseases { Gonorrhoea	...	...	...	...	...	...
Soft chancre	...	...	...	...	...	...
Syphilis	...	...	...	...	...	...
Other V. D.	...	...	...	...	...	...
Other diseases due to infection	16	1	0.55	3.9	0.24	0.13

Diseases due to { Scabies }	4	...	...	...	...
Infection by Metazoan parasites { Other diseases	18	...	0.25	4.3	0.06
<i>Other diseases classified under systems.</i>					
Diseases of the nervous system	29	...	1.19	7.0	0.29
Mental diseases	19	...	1.78	4.6	0.42
Diseases of the eye	7	...	0.17	1.7	0.04
Diseases of the ear and nose	32	...	0.77	7.7	0.19
Diseases of the {					
Circulatory system { Valvular disease of the heart	8	1	0.54	1.9	0.13
{ Disordered action of the heart	6	...	0.17	1.4	0.04
{ Other diseases	14	...	0.74	3.4	0.18
Blood and blood forming organs	18	...	0.73	4.3	0.18
Ductless or endocrine glands	8	...	0.42	1.9	0.10
Breast	3	...	0.38	1.9	0.09
Respiratory system { Larynx and trachea	1	...	0.01	0.2	0.00
{ Bronchi and bronchioles	39	...	1.08	9.4	0.26
{ Other diseases	7	...	0.31	1.7	0.07
Teeth and gums { Inflammation of tonsils	15	...	0.22	3.6	0.06
{ Inflammation of pharynx	52	...	1.08	12.5	0.25
{ Inflammation of stomach	6	...	0.09	1.4	0.02
Digestive system { Gastric ulcer	2	...	0.18	0.5	0.04
{ Duodenal ulcer	1	...	0.21	0.2	0.05
{ Liver	3	...	0.05	0.7	0.01
{ Other diseases	216	2	6.25	52.1	1.61
Diseases due to disorders of nutrition or of metabolism					
Diseases of the generative system {					
Diseases of bones, joints, muscles, fasciae and bursae {	3	...	0.04	0.7	0.01
{	364	4	14.64	87.5	3.53
{	22	...	0.92	5.3	0.22
Diseases of the articular tissue	41	...	1.03	9.9	0.25
Diseases of the skin	21	...	0.72	5.1	0.17
Diseases of the urinary system {	35	...	0.98	8.4	0.24
{ General {					
{ Local {					
{ In action {	1	1	0.01	0.2	0.00
{	84	8	1.43	8.2	0.34
{	...	...	...	...	...
Tumours and cysts	16	1	0.96	3.9	0.24
Poisons	1	1	0.00	0.2	0.00
No appreciable disease	35	...	1.17	8.4	0.28
*Suicides {	1	1	0.00	0.2	0.00
Total	1,326	17	45.96	319.7	11.08

*The figures against "suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

[illegible]

TABLE XI.

BRITISH OTHER RANKS.

Table showing admission and death ratios per 1,000 of strength by Commands contrasted with the previous year, and the average for the previous five years.

Commands.		Enteric group of fevers.		Influenza.		Cholera.		Smallpox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	{ 1932-36	2.8	0.21	16.5	..	..	..	0.1	0.00	92.5	0.05	22.3	..
	{ 1936	0.9	0.06	13.5	..	..	..	0.1	0.06	73.5	..	20.9	..
	{ 1937	1.2	0.14	8.5	..	..	..	0.1	0.07	45.6	0.07	21.6	0.07
Western Command	{ 1932-36	1.8	0.05	29.0	0.10	..	..	..	..	149.3	0.31	41.6	..
	{ 1936	0.3	..	9.4	..	..	..	..	..	103.9	0.22	35.3	..
	{ 1937	..	..	1.2	..	..	..	..	..	123.5	..	27.9	..
Eastern Command	{ 1932-36	3.1	0.25	17.9	0.03	0.1	..	0.1	..	53.5	0.05	25.7	0.03
	{ 1936	2.7	0.13	21.6	..	0.3	..	0.1	..	36.8	..	27.7	..
	{ 1937	0.7	0.07	25.8	..	0.1	..	0.3	..	23.9	0.07	29.0	0.07
Southern Command	{ 1932-36	1.2	0.12	9.7	0.01	..	..	0.1	..	54.7	0.07	26.3	..
	{ 1936	0.7	..	3.2	..	..	..	0.1	..	45.3	0.07	23.4	..
	{ 1937	0.6	0.07	18.3	..	..	..	0.1	..	43.2	..	25.5	..
All-India	{ 1932-36	2.4	0.13	15.9	0.02	0.0	..	0.1	0.00	74.2	0.07	25.8	0.01
	{ 1936	1.5	0.06	12.4	..	0.1	..	0.2	0.02	53.0	0.06	24.6	..
	{ 1937	0.8	0.03	16.4	..	0.0	..	0.1	0.02	44.5	0.04	25.5	0.04

TABLE XII.

VACCINATION PERFORMED IN THE BRITISH AND INDIAN ARMIES DURING 1937—OFFICERS AND OTHER RANKS.

Commands.	British Troops.									
	Officers.					Warrant and N. O. Officers and men.				
	Number.		Percentage of successful cases to total operations.			Number.		Percentage of successful cases to total operations.		
	P.	R.	P.	R.		P.	R.	P.	R.	
Northern	.	.	.	.	.	270	3,684	79	89	
Western	.	.	.	.	.	241	916	78	81	
Eastern	.	.	.	.	.	172	4,233	60	67	
Southern	.	.	.	.	.	683	2,515	71	87	
Total	15	467	67	82			11,347		79	
Indian Troops.										
Commands.	Indian commissioned, Non-commissioned officers and men.									
	King's Commissioned officers.					Followers.				
	Number.		Percentage of successful cases to total operations.			Number.		Percentage of successful cases to total operations.		
	P.	R.	P.	R.		P.	R.	P.	R.	
Northern	65	12,706	97	83		36	3,064	92	84	
Western	240	2,214	80	67		20	843	100	58	
Eastern	180	11,875	86	67		24	2,107	71	59	
Southern		5,919					1,606		73	
Total	485	32,714	85	72		80	7,520	87	72	
R.—Re-vaccinations.										
	P.—Primary.									

TABLE XIII.

VACCINATION PERFORMED IN THE FAMILIES—BRITISH ARMY DURING 1937.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern . . .	31	553	65	87	223	535	96	91
Western . . .	1	58	100	72	33	46	88	76
Eastern . . .	12	334	..	74	77	353	96	80
Southern . . .	12	208	67	91	254	307	87	90
Total	44	1,153	66	83	587	1,246	92	87

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TABLE XIV.

VACCINATION PERFORMED IN THE FAMILIES—INDIAN ARMY DURING 1937.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern . . .	..	62	..	81	2	50	100	94
Western . . .	..	16	..	19	4	7	100	29
Eastern . . .	1	76	100	33	62	32	94	25
Southern . . .	8	32	100	87	7	18	83	100
Total	9	186	100	59	75	107	93	70

SECTION II.
INDIAN ARMY, 1937.

TABLE B.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M. S. level in feet.	Autho- rity for height.	Points of reference.	Stations.	Height above M. S. level in feet.	Autho- rity for height.	Points of reference.
<i>Northern Command.</i>				<i>Eastern Command.</i>			
Abbottabad . . .	4,010	S. D.	Map.	Agra (Fort) . . .	525	S.D.	S.B.M.
Ambala . . .	902	"	S.B.M.	Alipore . . .	17	"	B.M.
Amritsar . . .	754	"	"	Allahabad . . .	314	"	S.B.M.
Bakloh . . .	4,585	"	Map.	Almora . . .	6,494	"	Map.
Bannu . . .	1,250	"	"	Bareilly . . .	563	"	S.B.M.
Campbellpore . . .	1,180	"	"	Benares . . .	256	"	"
Chitral . . .	4,980	"	"	Cawnpore . . .	407	"	B.M.
Dagshai . . .	6,087	"	"	Chittagong . . .	..	"	"
Dalhousie . . .	7,687	"	"	Comilla . . .	..	"	"
Dera Ismail Khan . . .	568	"	S.B.M.	Dacca . . .	20	M.D.	"
Dharamsala Cantt. . .	4,500	"	Map.	Dehra Dun . . .	2,232	S.D.	S.B.M.
Drosh Fort . . .	4,340	"	"	Delhi . . .	757	"	"
Ferozepore . . .	649	"	S.B.M.	Dinapore . . .	170	"	Church
Jhelum . . .	762	"	"	Fatehgarh . . .	467	"	"
Jullundur Cantt. . .	771	"	B.M.	Fyzabad . . .	330	"	S.B.M.
Jutogh . . .	6,370	"	Map.	Ghoom . . .	7,313	"	Jn. of road.
Kalabagh and Bara- gali . . .	7,963	"	"	Gyantse . . .	13,120	"	Map.
Kalabagh and Mari Indus . . .	682	"	"	Gorakhpore . . .	..	"	"
Kohat . . .	1,725	"	"	Jhansi . . .	849	S.D.	S.B.M.
Kuldana . . .	7,049	S.G.	"	Lansdowne . . .	5,823	"	Map.
Lahore Cantonment . . .	706	S.D.	S.B.M.	Lucknow . . .	333	"	B.M.
Landikotal . . .	3,509	"	Map.	Meerut . . .	737	"	S.B.M.
Lockhart Fort . . .	6,613	"	"	Midnapore . . .	..	"	"
Malakand . . .	2,740	"	"	Muttra . . .	560	S.D.	S.B.M.
Manzal . . .	1,650	"	"	Nowgong . . .	735	"	B.M.
Mardan . . .	1,000	"	"	Roorkee . . .	379	"	S.B.M.
Mir Ali . . .	2,240	S.G.	V.G.L.	Saldpur . . .	..	"	"
Mona . . .	3,500	S.D.	Map.	Shillong . . .	4,921	S.D.	Map.
Multan . . .	404	"	S.B.M.	<i>Southern Command.</i>			
Nowshera (Ry. Sta- tion) . . .	966	"	B.M.	Ahmedabad . . .	162	S.D.	S.B.M.
Peshawar . . .	1,152	"	S.B.M.	Ahmednagar . . .	2,180	"	Map.
Rawalpindi . . .	1,689	"	"	Aurangabad . . .	1,905	M.D.	"
Razmak . . .	6,556	"	Map.	Bangalore . . .	3,002	S.D.	S.B.M.
Risalpur . . .	1,014	"	B.M.	Baroda . . .	114	"	B.M.
Shagal . . .	3,174	"	"	Belgaum . . .	2,523	"	S.B.M.
Sargodha (Railway Rest House) . . .	615	"	"	Bombay (town hall) . . .	20	"	"
Stalkot . . .	829	"	"	Cannanore . . .	40	"	"
Solon . . .	5,078	"	"	Deolali . . .	1,394	"	S.B.M.
Subathu . . .	4,000	"	Map.	Jubbulpore . . .	1,320	"	"
Thall . . .	2,450	"	"	Kamptee (Rly. Sta- tion) . . .	940	"	B.M.
Wana . . .	4,630	"	V.G.L.	Mhow (Ry. Station) . . .	1,887	"	"
<i>Western Command.</i>				Mount Abu (Sanito- rium) . . .	3,336	"	"
Chaman Fort . . .	5,502	S.D.	Map.	Nasirabad . . .	1,461	"	B.M.
Fort Sandeman . . .	4,600	"	"	Pachmarhi . . .	3,490	"	"
Hindubagh . . .	5,821	"	"	Poona . . .	1,867	"	S.B.M.
Hyderabad (Sind) . . .	96	"	S.B.M.	Saugor . . .	1,755	"	"
Karachi (Holy Tri- nity Church) . . .	28	"	"	St. Thos. Mount (Ry. Station) . . .	34	"	B.M.
Loralai . . .	4,699	"	Map.	Madras (Obsy.) . . .	250	"	"
Quetta . . .	5,510	"	S.B.M.	Trichinopoly . . .	256	"	S.B.M.
				Trimulgherry . . .	1,843	"	Map.
				Wellington Sta. Hospl. . . .	5,800	"	"

* These heights are usually those of the survey-marks or of the mercury surface in barometer stations of meteorological observatories.

S. D. = Survey Department (Map Publication Office).

S. G. = Surveyor-General of India.

S.B.M. = Standard Bench Mark.

B.M. = G. T. Bench Mark.

V.G.L. = Village Ground Level.

Map. = Heights taken from Topo Maps.

M.D. = Meteorological Department.

TABLE XV.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

ALL-INDIA.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.
Average strength, 98,901.						
<i>Specific diseases due to infection or infestation.</i>						
Common cold	1,139	..	21.08	11.5	..	0.21
Diphtheria	2	..	0.16	0.0	..	0.00
Dysentery	1,226	4	48.05	12.4	0.04	0.49
Enteric fevers (inclusive of typhoid, para. A, B & C and enteric group).	88	9	18.40	0.9	0.09	0.14
Erysipelas	4	..	0.15	0.0	..	0.00
Influenza	565	..	12.17	6.7	..	0.12
Malaria	9,687	4	269.17	97.9	0.04	2.62
Measles	175	2	8.91	1.8	0.02	0.09
Meningococcal infection	17	10	1.25	0.2	0.10	0.01
Mumps	786	..	89.88	7.4	..	0.40
Pneumonia	514	34	38.92	5.2	0.34	0.39
Pyrexia of uncertain origin	8	..	0.00	0.1	..	0.01
Rheumatic fever	75	1	6.55	0.8	0.01	0.07
Sandfly fever	594	..	13.25	8.0	..	0.13
Scarlet fever	16	..	1.44	0.2	..	0.01
Smallpox	..	..	..	..	..	..
Tuberculosis { Pulmonary	159	12	19.22	1.6	0.12	0.19
Other {	35	6	5.63	0.4	0.06	0.06
Gonorrhoea	338	1	35.04	8.4	0.01	0.38
Soft chancre	172	..	17.02	1.2	..	0.17
Syphilis	800	..	80.65	3.0	0.02	0.31
Other V. D.	2	2	0.48	0.0	..	0.00
Veneral Diseases						

TABLE XV—contd. **INDIAN OFFICERS AND INDIAN OTHER RANKS—contd.**

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Average number constantly sick.
Other diseases due to infection								
Diseases due to Scabies	961	5	11	42.18	9.7	0.05	0.11	0.42
Infestation by metazoan parasites	761	..	..	24.36	7.7	..	..	0.25
Other diseases	770	1	4	43.41	7.8	0.01	0.04	0.44
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system	349	3	27	18.22	3.5	0.03	0.27	0.18
Mental diseases	95	..	38	8.09	1.0	..	0.38	0.08
Diseases of the eye	1,113	..	31	52.98	11.3	..	0.31	0.54
Diseases of the ear and nose	932	..	10	27.06	9.4	..	0.10	0.27
Diseases of the circulatory system.	16	2	6	1.02	0.2	0.02	0.06	0.01
Valvular disease of the heart	36	4	7	2.35	0.4	0.04	0.07	0.02
Disordered action of the heart	34	5	8	2.56	0.3	0.05	0.08	0.03
Other diseases	350	..	5	22.90	3.5	..	0.05	0.23
Diseases of blood and blood forming organs	14	..	2	1.08	0.1	..	0.02	0.01
Diseases of ductless or endocrine glands	2	..	..	0.14	0.0	..	..	0.00
Diseases of the breast	87	..	16	2.56	0.9	..	0.01	0.03
Diseases of the respiratory system.	1,813	1	16	44.01	13.3	0.01	0.16	0.44
Larynx and trachea	233	5	17	19.82	2.4	0.05	0.17	0.20
Bronchi & bronchioles	251	..	1	6.34	2.5	..	0.01	0.06
Other diseases	570	..	..	13.50	5.8	..	..	0.14
Diseases of the teeth and gums	1,589	..	..	33.49	16.1	..	..	0.34
Inflammation of tonsils	100	..	..	3.43	1.0	..	..	0.03
Inflammation of pharynx	5	1	1	0.78	0.1	0.01	0.01	0.01
Inflammation of stomach	7	1	..	0.84	0.1	..	..	0.01
Gastric ulcer	96	2	20	6.19	1.0	0.02	..	0.08
Duodenal ulcer	2,059	6	20	67.04	20.8	0.06	0.20	0.68
Liver diseases	20	2	5	0.76	0.2	0.02	0.05	0.01
Other diseases	234	..	4	9.78	2.4	..	0.04	0.10
Diseases due to disorders of nutrition or of metabolism	879	..	44	45.56	8.9	..	0.44	0.46
Diseases of the generative system	2,804	..	2	98.01	29.3	..	0.02	0.99
Diseases of bones, joints, muscles, fasciæ and bursa	1,422	..	8	59.87	14.4	..	0.08	0.61
Diseases of the areolar tissue	244	..	11	13.56	2.5	0.04	0.11	0.14
Diseases of the skin								
Diseases of the urinary system								

Injuries	General	7	43	77	1.22	0.4	0.02	0.78	0.01
	Local	29	6,122	238.06	51.8	0.2	0.29	..	2.41
	Infection	12	16	..	0.72	..	0.32	..	0.01
Tumours and cysts		1	188	10	7.59	3.3	0.01	0.10	0.08
Poisons		2	16	..	0.47	0.2	0.02	0.04	0.00
No appreciable disease		4	111	4	4.06	1.1	..	..	0.05
Suicides†		7	6	..	0.06	0.1	0.02	..	0.00
	Total	176	38,785	343	1,498.18	301.7	1.77	5.40	16.15

* Includes eight cases of malformations and three cases of carriers of dysentery.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XVI.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength, 43,811.								
Specific diseases due to infection or infestation.								
Common cold	407	...	...	8.40	9.3	...	...	0.19
Diphtheria	1	...	...	0.13	0.0	...	...	0.00
Dysentery	489	1	...	18.55	11.2	0.02	...	0.42
Enteric fever (inclusive of typhoid, para. A, B & C, and enteric group).	46	4	...	7.10	1.0	0.09	...	0.16
Erysipelas	4	...	...	0.15	0.1	...	...	0.00
Influenza	218	...	...	4.62	5.0	...	...	0.11
Malaria	4,535	1	...	106.32	103.5	0.02	...	2.43
Measles	81	1	...	3.88	1.8	0.02	...	0.09
Meningococcal infection	16	9	...	1.13	0.4	0.21	...	0.03
Mumps	327	15	...	20.75	7.5	...	...	0.47
Pneumonia	261	...	...	18.30	6.0	0.34	...	0.42
Pyrexia of uncertain origin	3	...	...	0.38	0.1	...	...	0.01
Rheumatic fever	36	...	1	3.22	0.8	...	0.02	0.07
Sandfly fever	423	...	...	9.85	9.8	...	...	0.22
Scarlet fever	...	...	...	...	...	...	...	...
Smallpox	7	...	...	0.63	0.2	...	...	0.01
Tuberculosis	71	7	64	8.83	1.6	0.16	1.46	0.20
{ Pulmonary	14	1	12	2.85	0.3	0.02	0.27	0.07
{ Other								
Veneral diseases	116	1	3	12.25	2.6	0.02	0.07	0.28
{ Gonorrhoea	47	...	...	5.08	1.1	...	...	0.12
{ Soft chancre	92	...	...	8.68	2.1	...	...	0.20
{ Syphilis	2	...	...	0.35	0.0	...	0.02	0.01
{ Other V. D.								

Other diseases due to infection	1	3	16.16	5.3	0.02	0.07	0.37
Diseases due to infestation { Scabies	...	...	7.90	5.6	...	...	0.18
by metazoan parasites. { Other diseases .	1	...	20.91	7.3	0.02	0.07	0.48
<i>Other diseases classified under systems.</i>							
Diseases of the nervous system	1	12	8.73	3.5	0.02	0.27	0.20
Mental diseases	...	20	4.52	1.1	...	0.48	0.10
Diseases of the :—	...	...	...	...	...	...	...
Eye	...	13	24.28	10.8	...	0.30	0.55
Ear and nose .	...	1	11.22	7.5	...	...	0.26
Circulatory system.	...	...	...	...	...	...	...
{ Valvular disease of the heart	...	2	0.14	0.1	0.02	0.05	0.00
{ Disordered action of the heart	1	...	0.83	0.1	0.02	0.07	0.03
{ Other diseases .	1	3	1.29	0.8	0.02	...	...
Blood and blood forming organs	...	2	8.22	3.2	...	0.05	0.19
Diseases of ductless or endocrine glands .	...	2	0.40	0.1	...	0.05	0.01
Diseases of the breast .	...	...	...	...	...	...	...
Diseases of the respiratory system.	...	...	...	...	...	...	...
{ Larynx and trachea .	...	...	0.77	0.7	...	...	0.02
{ Bronchi and bronchioles	...	5	17.19	11.9	...	0.11	0.39
{ Other diseases .	3	10	9.59	2.9	0.07	0.23	0.22
Diseases of the teeth and gums	...	...	...	...	...	...	...
{ Inflammation of tonsils	...	...	2.71	2.5	...	...	0.06
{ Inflammation of pharynx .	...	...	5.45	5.8	...	...	0.12
{ Inflammation of stomach	...	...	16.08	17.6	...	...	0.37
{ Other diseases	...	...	1.72	1.0	...	...	0.04
Diseases of the digestive system.	...	...	...	...	...	...	...
{ Gastric ulcer	...	...	0.06	0.0	...	...	0.00
{ Duodenal ulcer	...	...	0.06	0.0	...	...	0.00
{ Liver diseases	1	...	3.21	0.8	0.02	0.07	0.07
{ Other diseases	3	11	25.67	18.5	0.07	0.25	0.59
Diseases due to disorders of nutrition or of metabolism	...	...	...	...	...	...	...
Diseases of the generative system	1	2	0.23	0.1	0.02	0.05	0.01
Diseases of bones, joints, muscles, fasciæ and bursæ	...	3	2.84	1.8	...	0.07	0.06
{ Diseases of the aricular tissue .	...	21	18.06	8.6	...	0.48	0.41
Diseases of the skin	...	...	...	...	...	...	...
Diseases of the urinary system	...	...	...	...	...	...	...
{ General .	...	...	39.90	26.6	...	0.14	0.68
{ Local .	...	6	23.68	18.2	...	0.54	0.10
{ In action.	5	1	4.57	2.5	0.07	0.02	...
Injuries	...	...	...	...	...	...	...
{ General .	3	35	0.35	0.3	0.07	0.30	0.01
{ Local .	17	...	102.22	49.2	0.30	0.02	...
{ In action.	12	...	0.74	0.4	0.27	...	...
Tumours and cysts	...	...	...	...	...	...	...
Poisonous	1	8	3.05	1.3	0.02	0.07	0.07
No appreciable disease	...	...	0.14	0.2	...	0.02	0.05
{ Diseases .	...	1	2.39	1.0	...	...	...
Snaildise*	...	...	0.04	0.1	...	0.09	0.00
Total	89	240	628.68	376.1	2.03	5.48	14.30

* The figures against " Snaildise " having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

† Includes 3 cases of malformations.

TABLE XVII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*
WESTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio Per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Average number constantly sick.
Average strength, 11,656.								
<i>Specific diseases due to infection or infestation.</i>								
Common cold								
Diphtheria	278	..	..	4.95	23.9	..	..	0.42
Dysentery	122	2	..	4.07	10.5	0.17	..	0.40
Enteric fever (inclusive of typhoid, para. A, B & O and enteric group).	8	1	..	1.27	0.7	0.09	..	0.11
Erysipelas								
Influenza	16	..	..	0.30	1.4	..	..	0.03
Malaria	1,887	1	..	53.20	161.9	0.09	..	4.99
Measles	80	..	..	1.60	2.6	..	..	0.14
Meningococcal infection								
Mumps	16	1	..	0.92	1.4	0.09	..	0.08
Pneumonia	35	..	..	4.12	3.0	..	..	0.35
Pyrexia of uncertain origin								
Rheumatic fever	4	..	..	0.33	0.3	..	..	0.03
Sandfly fever	110	..	..	2.11	9.4	..	..	0.18
Scarlet fever								
Smallpox								
Tuberculosis								
{ Pulmonary	11	..	11	2.38	0.9	..	0.94	0.20
{ Other	10	..	3	1.89	0.9	..	0.26	0.12
Venereal diseases.								
{ Gonorrhoea	22	..	..	2.19	1.9	..	..	0.19
{ Soft chancre	10	..	..	1.01	0.9	..	..	0.09
{ Syphilis	25	..	..	2.61	2.1	..	..	0.22
{ Other V. D.								
Other diseases due to infection	35	..	1	2.48	3.0	..	0.09	0.21
Diseases due to infestation by { Scabies	38	..	..	1.26	3.3	..	..	0.11
metazoan parasites. { Other diseases	106	..	..	6.43	9.1	..	..	0.55

TABLE XVIII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—contd.

EASTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.
Average strength, 23,635.	Average number constantly sick.			Average number constantly sick.		
<i>Specific diseases due to infection or infestation.</i>						
Common cold	311	...	...	13.2	...	0.24
Diphtheria	...	...	...	...	...	...
Dysentery	275	...	...	11.6	...	0.47
Enteric fever (inclusive of typhoid, para. A, B & C and enteric group)	21	4	...	0.9	0.17	0.13
Erysipelas	...	...	...	...	...	...
Influenza	103	...	...	4.4	...	0.08
Malaria	1,946	2	...	82.3	0.08	2.69
Menses	47	1	...	2.0	0.04	0.10
Meningococcal infection	1	1	...	0.0	0.04	0.01
Mumps	336	...	...	14.2	...	0.62
Pneumonia	150	13	...	6.7	0.55	0.52
Pyrexia of uncertain origin	...	...	...	...	...	...
Rheumatic fever	15	1	1	0.6	0.04	0.07
Sandy fever	46	...	...	1.9	...	0.04
Scarlet fever	...	...	...	...	...	...
Small pox	5	...	...	0.2	...	0.02
Tuberculosis	Pulmonary	4	43	0.2	0.17	1.82
	Other	6	2	0.3	0.13	0.08
Venereal diseases	Gonorrhoea	...	...	5.5	...	0.56
	Soft chancre	120	...	5.28	...	0.24
	Syphilis	53	...	2.2	...	0.24
	Other V. D.	89	...	3.8	...	0.44
	...	...	1	...	...	0.04

Other diseases due to infection	473	2	4	12.45	20.0	0.08	0.17	0.53
Diseases due to infestation { Scabies	252	...	...	7.95	10.7	...	...	0.34
by mitezoan parasites { Other diseases	177	...	1	7.32	7.5	...	0.04	0.31
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system	77	...	0	8.90	3.8	...	0.38	0.17
Mental diseases	20	...	8	1.37	0.8	...	0.34	0.06
Diseases of the eye	319	...	7	14.50	13.5	...	0.80	0.61
Diseases of the ear and nose	243	...	3	5.71	10.3	...	0.13	0.24
Diseases of the (Valvular disease of the heart	4	1	1	0.38	0.2	0.04	0.04	0.02
circulatory sys- { Disordered action of the heart.	7	...	4	0.55	0.3	0.55	0.17	0.02
tem. { Other diseases	14	2	4	0.81	0.6	0.08	0.17	0.03
Diseases of the blood and blood forming organs	87	...	2	6.66	3.7	...	0.08	0.23
Diseases of ductless or endocrine glands	7	...	...	0.35	0.3	...	0.01	0.01
Diseases of the breast	1	...	...	0.06	0.0	...	...	0.00
Diseases of the res- { Larynx and trachea	19	...	...	0.49	0.8	...	...	0.02
piratory sys- { Bronchi and bronchioles.	409	1	4	13.01	17.8	0.04	0.17	0.37
tem. { Other diseases	43	1	4	3.64	1.8	0.04	0.17	0.15
Diseases of the teeth and gums	66	...	...	1.58	2.8	...	...	0.07
{ Inflammation of tonsils								
{ Inflammation of pharynx								
{ Inflammation of stomach								
{ Gastric ulcer								
{ Duodenal ulcer								
{ Liver								
{ Other diseases								
Diseases due to disorders of nutrition or of metabolism	4	1	2	0.11	0.2	0.04	0.08	0.00
Diseases of the generative system	65	...	1	2.90	2.8	...	0.04	0.12
Diseases of bones, joints, muscles, fasciae and bursae	217	...	15	12.74	9.2	...	0.68	0.54
Diseases of the areolar tissue	790	...	2	27.65	33.4	...	0.08	1.17
Diseases of the skin	380	...	...	14.82	15.2	...	...	0.63
Diseases of the urinary system	57	...	5	4.63	2.4	...	0.21	0.20
{ General								
{ Local								
{ In action								
Lejures	3	8	13	0.04	0.1	0.13	0.55	0.00
	1,276	...	...	60.67	54.0	0.34	2.57	2.57
Tumours and cysts	43	...	5	3.21	1.8	0.04	0.21	0.14
Poisons	4	...	...	0.10	0.2	...	...	0.00
No appreciable disease*	30	...	2	1.28	1.3	0.04	0.08	0.06
Suicides†	...	...	...	...	...	0.04	...	...
Total	9,870	52	148	386.69	418.0	2.20	6.20	10.78

*Includes three cases of malformations and three cases of carriers of dysentery.

†The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XIX—contd.
INDIAN OFFICERS AND INDIAN OTHER RANKS—contd.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Average number constantly sick.
<i>Specific diseases due to infection or infestation.</i>								
Diseases of the areolar tissue	773	...	...	25.29	39.0	...	...	1.28
Diseases of the skin	322	...	1	12.99	16.3	...	0.05	0.66
Diseases of the urinary system	64	1	3	3.19	2.7	0.05	0.15	0.10
Injuries	11	...	...	0.40	0.6	...	...	0.02
{ General	1,227	2	22	56.39	62.0	0.10	1.11	2.85
{ Local	21	...	1	1.16	1.1	...	0.05	0.06
Tumours and cysts	5	1	...	0.23	0.3	0.05	...	0.01
Poisons	19	...	1	0.51	1.0	0.05	0.05	0.03
No appreciable disease	2	1	...	0.02	0.1	...	...	0.00
Suicides*	7,727	21	115	300.72	390.3	1.06	5.81	15.19
Total								

* The figures against "Suicides" having already been shown under the heading injury, etc., which caused death are not included in the total.

TABLE X.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.**Table showing monthly ratios per 1,000 of strength of admissions for certain diseases for All-India during the year 1937.*

Month..	Enteric group of fevers.	Influenza.	Cholera.	Smallpox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudate.	Dysentery group.	Pyrexia of uncertain origin.	Plasmoma lobar and lobular.	Dysentery.	Dysentery.	Sandy fever.	Plague.	Effects of heat.	All causes.
January	0.1	0.5	...	0.0	8.2	0.0	0.2	0.1	0.1	...	0.7	0.2	0.0	0.0	...	...	26.8
February	0.0	0.3	...	0.0	1.6	0.0	0.1	0.0	0.1	...	0.5	0.1	0.0	0.0	...	...	19.2
March	0.0	0.3	...	0.0	1.9	...	0.2	0.1	0.2	...	0.3	0.3	...	0.0	...	...	31.9
April	0.1	0.1	...	0.0	2.5	0.1	0.6	0.2	0.2	0.0	0.4	0.5	2.6	0.2	...	...	27.8
May	0.1	0.2	...	...	3.9	0.1	0.6	0.3	0.3	...	0.3	0.7	0.4	1.3	...	...	30.2
June	0.2	0.1	...	0.0	6.3	0.1	0.6	0.8	0.3	0.0	0.3	0.6	0.0	1.2	...	...	31.6
July	0.1	0.6	...	...	9.5	0.1	0.8	0.3	0.2	...	0.2	0.6	0.3	1.3	...	...	36.7
August	0.1	0.2	...	...	16.6	0.1	1.2	0.3	0.4	...	0.3	1.0	0.6	1.3	...	...	45.0
September	0.1	0.2	...	...	21.2	0.1	0.9	0.4	0.3	...	0.3	0.6	0.3	0.8	...	...	47.5
October	0.0	0.3	0.0	0.0	17.7	0.1	0.7	0.3	0.1	...	0.4	0.4	0.6	0.3	...	0.0	43.2
November	0.1	0.3	...	0.0	9.8	0.1	0.7	0.3	0.2	0.0	0.5	0.4	0.1	0.1	...	...	42.6
December	0.0	1.6	...	...	5.4	0.1	0.4	0.1	0.2	0.0	1.0	0.3	0.1	0.0	...	...	32.7
Total	0.9	5.4	0.0	0.2	94.9	0.8	6.5	2.6	2.5	0.1	5.3	5.4	5.3	6.0	...	0.2	389.5

TABLE

INDIAN OFFICERS AND

Table showing ratios per 1,000 of strength of admissions for certain

[illegible]

XXI.

INDIAN OTHER RANKS.

diseases in each Station and District in India during the year 1937.

Colitis.	Diarrhoea.	Cholera.	Verueal diseases.	Smallpox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number con-stantly sick.
1:1	1:6	..	4:3	..	19:4 50:7 120:9	..	12:9 13:3 14:6	..	13:5	8:6 10:8	..	..	238:7 214:7 340:2	4:97 9:10 9:41
..	2:1	..	3:1	..	188:7	..	42:5	..	1:0	1:6	..	..	415:1	11:57
..	10:8	..	3:2	..	109:6 63:5	..	15:3	..	8:2	6:3 3:2	..	3:6	353:9 447:6	12:85 16:12
1:9	1:9	..	6:6	0:2	86:9	..	17:8	..	0:2	5:2	..	..	355:7	15:39
..	6:3	..	3:3	..	34:0	..	13:9	..	1:3	3:8	..	..	317:4	7:75
..	4:9	..	11:5	..	258:0	..	1:6	..	3:8	3:3	..	..	459:9	10:65
0:9	4:1	..	4:8	0:1	95:0	..	15:6	..	2:7	5:2	..	0:6	365:3	13:26
..	2:9	..	8:7	..	11:6	..	..	..	..	5:8	..	..	299:4	8:60
..	11:2	0:3	7:3	..	123:7	..	10:9	..	..	6:4	..	..	467:1	16:97
..	6:1	..	..	..	190:4	..	1:0	..	..	2:0	..	..	405:3	11:48
..	9:5	0:2	5:9	..	123:7	..	8:0	..	..	5:4	..	..	441:5	15:13
..	0:4	..	4:9	..	278:5	..	22:0	..	..	4:9	..	..	502:7	14:04
0:8	..	..	12:3	..	175:3	..	11:9	..	..	35:7	..	..	142:9	7:14
..	..	..	..	..	201:8	..	9:9	..	6:6	2:5	..	..	326:7	10:63
..	23:3	..	..	..	116:3	..	..	..	23:3	17:5	..	..	403:5	32:81
..	23:8	..	..	..	119:0	..	..	..	..	..	..	..	697:7	14:88
0:9	5:2	..	7:2	..	108:7	..	19:5	..	27:0	23:3	..	..	809:5	13:81
..	..	..	..	..	..	..	..	..	..	5:2	..	..	446:4	13:07
0:6	2:9	..	7:1	..	172:7	..	18:0	..	14:8	5:8	..	..	443:0	15:63
..	1:3	..	7:6	..	43:0	..	5:4	..	5:4	10:8	..	..	401:3	17:50
..	..	..	6:5	..	55:4	..	19:6	..	..	6:5	..	..	248:4	6:36
..	2:2	..	4:4	..	112:3	..	..	..	..	11:0	..	..	335:5	15:35
..	..	..	62:5	..	..	..	..	..	..	..	..	..	250:0	16:25
..	1:8	..	9:0	..	130:0	..	1:8	..	..	3:6	..	..	80:7	5:00 8:40
..	1:1	..	4:5	..	35:6	..	..	..	..	6:8	..	..	204:5	9:07
..	1:8	..	4:9	..	60:0	..	0:6	..	..	6:1	..	0:6	238:3	11:02
..	5:3	..	21:1	..	68:4	..	..	..	..	..	..	..	326:3	14:16
3:8	12:2	..	8:4	2:5	50:7	..	2:5	..	..	5:5	..	..	375:4	14:04
..	3:8	..	15:4	..	100:0	..	3:8	..	..	7:7	..	8:8	473:1	20:27
..	8:1	..	4:8	..	34:4	..	..	..	..	4:3	..	..	279:9	11:30
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Unlabeled.
<i>Total Lahore District</i>	12,079	0.9	0.3	..	..	0.2	3.0	1.9	0.6	3.7
Bannu	261	..	..	..	..	..	..	..	..	..
D. I. Khan	92	..	..	..	..	..	..	..	..	..
Kalabagh and Marladus	168	6.0	..	..	..	..	..	..	..	11.9
Manzal	1,098	..	..	..	..	..	13.7	..	..	0.9
Razmak	733	..	..	..	..	..	..	..	..	1.4
Wana	3,511	..	..	..	..	0.6	3.1	..	..	3.1
<i>Total Waziristan District</i>	5,863	0.2	..	..	..	0.3	4.4	..	..	2.6
Chaman	1,318	..	0.8	..	..	1.5	0.8	0.8	..	3.0
Quetta	4,206	..	0.2	..	..	..	4.3	0.5	..	6.4
<i>Total Baluchistan District</i>	5,524	..	0.4	..	..	0.4	3.4	0.5	..	5.6
Fort Sandeman	2,502	0.4	..	..	..	1.2	3.6	3.2	0.4	..
Hindubagh	282	..	..	..	..	..	3.5	..	..	3.5
Loralai	1,062	..	..	..	..	..	..	..	..	1.9
<i>Total Zhob Bde. Area</i>	3,846	0.3	..	..	..	0.8	2.6	2.1	0.3	0.3
Hyderabad	542	..	..	..	..	..	1.8	3.7	..	1.8
Karachi	1,744	..	..	..	..	..	6.9	12.0	2.9	2.9
<i>Total Sind Bde. Area</i>	2,286	..	..	..	..	..	5.7	10.1	2.2	2.6
Bareilly	1,060	..	..	..	..	..	3.5	0.9	..	0.9
Dehra Dun	2,367	0.8	..	..	..	1.7	5.9	0.8	2.1	1.3
Jhansi	1,306	0.8	..	..	..	..	18.4	5.4	1.5	0.3
Landsdowne	1,875	0.5	..	..	..	..	2.7	3.7	..	..
Meerut	2,417	1.2	..	..	..	..	14.1	3.7	0.4	0.4
Nowgong	77	..	..	..	..	18.0	13.0	..	..	..
Roorkee	1,955	1.0	..	..	..	..	4.1	1.5	..	2.0
<i>Total Meerut District</i>	11,057	0.8	..	..	..	0.5	3.6	2.6	0.7	0.9
Almora	285	..	..	..	..	..	24.6	..	..	..
Allahabad	825	..	..	..	..	..	7.8	..	..	3.6
Benares	215	..	..	..	..	..	9.2	4.7	..	..
Cawnpore	86	..	..	..	..	..	11.6	..	..	..
Fatehgarh	672	..	..	..	..	..	4.5	3.0	3.0	6.0
Fyzabad	555	..	..	..	..	..	1.8	5.4	1.8	3.6
Gorakhpore	141	..	..	..	..	..	..	7.1	..	..
Lucknow	1,837	..	..	..	..	2.2	16.3	1.1	1.6	3.8
<i>Total Lucknow District</i>	4,616	..	..	..	..	0.9	10.8	1.9	1.3	3.5
Calcutta (Alipore)	712	..	1.4	..	..	..	2.8	4.2	4.2	..
Dinapore	40	..	..	..	..	..	..	..	..	25.0
Gyantse	89	..	..	..	..	..	..	..	..	..
Ghoom	68	..	..	..	..	..	..	..	..	..
Shillong	1,928	0.5	..	..	..	..	3.1	3.6	1.6	1.0
Chittagong	382	..	..	..	..	..	6.0	..	3.0	3.0
Comilla	276	..	..	..	..	..	..	..	..	..
Dacca	534	..	..	..	..	1.9	..	..	..	..
Midnapore	530	..	..	..	..	..	..	..	..	..
Saidpur	451	..	..	..	..	..	17.7	2.2	..	4.4

XXI—contd.

Colds.	Diarrhea.	Cholera.	Veneral diseases.	Smallpox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
0.7	4.7	..	6.9	0.4	56.8	..	2.1	..	1.0	6.5	..	0.2	312.4	12.83
..	3.8	..	7.7	..	19.2	..	..	..	..	19.2	..	..	348.7	25.90
..	11.9	..	32.6	..	217.4	..	108.7	..	..	10.9	..	..	669.6	33.80
..	..	..	..	6.0	136.9	..	..	..	..	6.0	..	..	482.1	17.74
..	10.0	..	3.6	..	102.0	..	6.4	..	..	1.8	..	1.8	347.9	11.81
..	5.5	..	4.1	..	19.1	..	..	..	12.3	16.4	..	..	388.8	26.36
..	2.3	..	4.8	..	143.0	..	..	..	15.9	7.4	..	..	405.6	16.39
..	4.4	..	4.9	0.2	115.3	..	2.9	..	11.1	8.0	..	0.3	399.6	17.51
..	9.9	..	3.0	..	75.1	..	9.1	..	1.5	0.8	..	..	295.1	9.82
..	4.3	..	6.4	..	156.0	..	6.4	..	3.1	2.6	..	0.7	393.7	20.17
..	5.6	..	5.6	..	136.7	..	7.1	..	2.7	2.2	..	0.5	370.2	17.70
..	5.6	..	5.6	..	232.6	..	13.6	..	..	6.4	..	..	497.6	13.38
..	17.7	..	8.5	..	471.6	..	..	..	3.5	3.5	..	..	787.2	15.85
..	1.9	..	0.9	..	226.9	..	7.5	..	..	0.9	..	..	400.2	9.38
..	5.5	..	4.2	..	248.6	..	10.9	..	0.3	4.7	..	..	491.9	12.46
2.3	1.8	..	3.7	..	68.3	..	..	..	..	..	..	..	228.8	10.83
..	6.9	..	4.6	..	79.7	..	16.6	..	..	2.9	..	4.0	338.9	12.99
1.7	5.7	..	4.4	..	77.0	..	12.7	..	..	2.2	..	3.1	312.8	12.43
1.3	15.1	..	8.5	..	79.2	..	..	..	1.9	4.7	..	..	394.8	17.24
..	3.4	..	16.1	1.3	89.6	..	..	..	3.8	3.9	..	..	546.3	23.76
..	2.3	..	3.8	..	163.1	..	8.4	..	1.5	6.9	..	..	433.2	20.34
..	24.0	0.5	9.6	..	117.9	..	..	..	0.5	3.7	..	..	365.9	16.25
..	4.6	..	5.8	0.4	44.3	..	..	..	0.4	3.7	..	..	233.0	12.85
..	13.0	..	..	..	103.9	..	..	..	..	18.0	..	..	480.5	15.32
..	7.7	..	11.3	..	78.8	..	..	..	0.5	9.2	..	..	348.3	12.23
0.3	9.0	0.1	9.6	0.4	90.4	..	1.0	..	1.4	6.3	..	..	400.7	16.97
1.2	14.0	..	8.5	..	129.8	..	3.5	..	..	17.5	..	..	456.1	20.85
..	3.6	..	9.7	..	40.0	..	3.6	..	..	4.8	..	..	417.0	15.49
..	14.0	..	37.2	..	37.2	..	9.3	..	4.7	9.3	..	..	386.0	15.07
..	..	..	11.6	..	11.6	..	..	..	..	..	11.6	..	325.6	10.12
..	7.4	..	1.5	..	178.6	..	..	..	22.3	6.0	..	..	516.4	18.50
..	7.2	..	3.6	..	34.2	..	7.2	..	..	3.6	..	..	342.3	11.23
..	..	..	28.4	..	202.4	..	..	..	..	7.1	..	..	510.6	15.25
..	12.5	..	20.7	..	43.5	..	7.6	..	1.6	4.4	..	..	436.6	24.37
0.2	9.1	..	13.6	..	72.6	..	5.2	..	4.1	5.6	0.2	..	432.4	19.12
..	2.8	..	14.0	..	52.0	137.6	..	..	7.0	5.6	..	..	491.6	34.20
..	..	..	..	..	22.5	..	..	..	78.7	11.2	..	..	125.0	2.00
..	..	..	..	..	..	..	..	..	..	..	..	..	224.7	7.30
..	..	..	15.0	..	14.7	..	..	..	..	14.7	..	..	279.4	8.09
..	13.5	..	24.1	..	128.6	..	..	..	..	15.0	..	..	587.1	20.63
..	..	..	10.9	..	69.3	6.0	..	..	6.0	3.0	..	..	433.7	12.53
..	..	..	..	..	108.7	..	..	..	..	14.5	..	..	539.9	13.26
..	3.7	..	15.0	..	114.2	548.7	..	..	46.8	3.7	..	..	831.5	15.02
6.7	..	..	30.2	..	152.8	..	..	..	34.0	3.8	..	..	322.6	6.81
..	..	..	18.3	..	25.8	..	..	..	..	8.9	..	..	339.2	10.09

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
<i>Total P. & A. District.</i>	4,960	0.2	0.2	..	..	0.2	3.6	2.2	1.4	1.2
Agra	593	..	..	..	..	..	..	..	..	..
Delhi	1,735	..	..	..	..	..	1.2	0.6	0.6	..
Muttra	674	..	..	..	..	..	7.4	..	..	1.5
<i>Total Delhi Bds. Area</i>	3,002	..	..	..	..	..	2.3	0.3	0.3	0.3
Ahmednagar	518	..	..	..	..	..	3.9	15.4	..	3.9
Aurangabad	1,004	1.0	..	..	..	..	5.0	1.0	..	8.0
Jubbulpore	2,076	..	..	..	..	1.0	10.1	10.1	..	0.5
Kamptee	223	..	..	..	..	..	..	..	..	..
Pachmarhi	329	..	..	..	..	..	..	..	..	..
Saugor	375	..	..	..	..	..	..	3.5	..	..
Trimulgherry (Secunderabad).	2,997	..	..	..	..	..	19.0	4.8	2.7	1.7
<i>Total Deccan District</i>	7,522	0.1	..	..	..	0.3	11.3	6.6	1.1	2.1
Belgaum	1,167	1.7	1.7	..	..	..	0.9	1.7	..	..
Poona	3,725	0.3	..	..	..	..	20.4	4.0	..	2.1
<i>Total Poona Bds. Area</i>	4,892	0.6	0.4	..	..	..	15.7	3.5	..	1.6
Ahmedabad	532	..	..	..	..	..	7.5	16.9	1.9	13.2
Baroda	461	..	..	..	..	..	4.3	6.5	..	..
Bombay (Colaba)	547	..	..	..	..	1.8	3.7	1.8	1.8	..
Deolali	323	..	..	..	..	..	..	..	..	..
Mhow	911	..	..	..	..	..	1.1	1.1	1.1	..
Mt. Abu	19	..	..	..	..	..	52.6	..	..	..
Nasirabad	721	..	..	..	..	..	4.2	2.8	..	..
<i>Total Bombay District</i>	3,514	..	..	..	..	0.3	4.0	4.6	0.9	2.0
Bangalore	2,598	..	0.4	..	..	0.4	8.9	1.5	2.7	0.4
Cannanore	575	..	1.7	..	..	1.7	..	3.5	..	1.7
Madras, St. Thomas Mt.	547	..	..	..	..	..	1.8	3.7	..	3.7
Trichinopoly	106	..	..	..	..	..	..	..	..	..
Wellington	45	..	..	..	..	..	22.2	..	..	..
<i>Total Madras District</i>	3,871	..	0.5	..	..	0.5	6.5	2.1	1.8	1.0
<i>Total All-India</i>	98,901	0.4	0.2	..	..	0.3	6.6	2.5	0.8	2.6

XXI—concl'd.

Colitis.	Diarrhoea.	Cholera.	Veneral diseases.	Smallpox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
0.6	6.0	..	16.1	..	100.0	79.2	..	..	11.5	9.7	..	..	521.6	18.03
..	6.7	..	8.4	..	69.1	..	8.4	..	..	8.4	..	..	306.9	11.69
..	2.3	..	8.1	0.6	26.5	..	2.9	..	2.9	5.3	..	..	304.3	10.54
..	4.5	..	4.5	..	43.0	..	1.5	..	3.9	4.5	..	..	231.5	8.95
...	3.7	..	7.3	0.8	38.6	..	3.7	..	3.7	5.0	..	..	288.5	10.41
..	1.9	..	11.6	..	27.0	3.9	1.9	..	..	1.9	..	..	380.3	15.23
..	1.0	..	7.0	..	124.5	..	..	..	..	4.0	..	..	372.5	14.37
..	8.2	..	6.3	..	91.5	0.5	..	..	3.9	1.4	..	..	487.5	17.03
..	..	..	9.0	..	148.0	..	..	..	..	9.0	..	..	412.6	18.34
3.0	..	..	..	..	100.3	..	..	..	..	..	..	..	170.2	3.10
..	2.7	..	..	..	133.3	..	..	..	..	8.0	..	..	394.7	10.72
..	2.0	..	7.3	..	18.7	..	1.0	..	10.3	1.0	..	..	357.0	14.33
0.1	3.5	..	6.6	..	66.6	0.4	0.5	..	5.2	2.1	..	..	392.1	14.59
..	4.3	..	12.9	2.6	20.6	..	..	..	..	4.3	..	..	495.3	15.31
1.1	4.8	..	16.4	..	100.1	..	0.3	..	23.1	3.2	..	0.5	375.3	13.10
0.8	4.7	..	15.5	0.6	31.2	..	0.2	..	17.6	3.5	..	0.4	403.9	18.63
..	3.8	..	3.8	..	186.1	5.6	0.4	..	1.9	13.2	..	..	516.9	16.50
..	15.2	..	10.8	..	160.5	..	..	..	..	2.2	..	..	466.4	14.10
..	3.7	..	20.1	..	20.1	..	..	..	25.6	1.8	..	..	356.5	18.65
3.1	..	..	12.4	3.1	49.5	..	..	..	..	6.2	..	..	399.4	15.39
..	3.3	..	6.6	..	99.9	..	..	..	..	..	1.1	..	299.7	11.82
..	1.7	..	1.4	..	83.2	..	..	..	..	2.8	..	..	631.6	16.84
..	15.3	..	..	..	..	..	..	..	..	..	..	..	334.3	15.42
0.3	7.1	..	8.3	0.3	99.9	0.9	1.4	..	4.3	3.7	0.3	..	331.3	14.99
0.4	2.3	..	19.6	..	18.9	30.8	..	..	4.2	4.2	..	..	397.2	20.45
..	..	..	24.3	..	7.0	..	..	..	87.0	..	..	..	386.1	14.57
..	3.7	..	11.0	..	29.3	31.1	..	..	49.4	3.7	..	..	310.8	15.74
..	..	..	9.4	..	..	47.2	..	..	..	..	..	..	301.9	10.66
..	..	..	..	..	22.2	..	..	..	..	..	..	..	133.3	8.89
0.3	2.1	..	18.6	..	18.1	26.3	..	..	22.7	3.4	..	..	377.7	18.51
0.4	5.4	0.0	8.2	0.2	97.9	5.1	6.0	..	5.7	5.2	0.0	0.3	391.7	15.15

TABLE XXII.

BRITISH OFFICERS OF THE INDIAN ARMY.

Table showing the average strength, admissions into hospital, deaths, invalids and constantly sick, during the year 1937, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.
Average strength, 1,841.				Constantly sick.		
Specific Diseases due to infection or infestation.						
Common cold	27	...	...	14.7	...	0.27
Diphtheria	5	...	...	3.7	...	0.30
Dysentery	48	...	...	26.1	...	0.92
Enteric fever (inclusive of typhoid, Para. A, B & O and enteric group).	2	...	...	1.1	...	0.18
Erysipelas	1	...	...	0.5	...	0.03
Influenza	19	...	...	10.3	...	0.18
Malaria	70	...	...	38.0	...	1.04
Measles	2	...	...	1.1	...	0.05
Meningococcal infection	...	...	...	...	...	...
Mumps	...	...	...	...	...	...
Pneumonia	4	1	...	2.2	0.54	0.12
Pyrexia of uncertain origin	...	...	...	...	...	...
Rheumatic fever	2	...	1	1.1	...	0.10
Sandy fever	20	...	...	14.1	...	0.21
Scarlet fever	...	...	...	...	...	...
Smallpox	2	...	...	1.1	...	0.04
Tuberculosis { Pulmonary	3	...	3	1.6	...	0.09
Other .	...	...	...	...	1.63	...
Veneral diseases. { Gonorrhoea	4	...	...	2.2	...	0.10
Soft chancre	1	...	...	0.5	...	0.04
Syphilis	...	...	...	...	...	...
Other V. D.	...	...	...	...	...	...
Other diseases due to infection	19	...	...	10.3	...	0.36
Diseases due to infestation by metazoan parasites. { Scabies	...	...	...	...	...	...
Infestation by	...	...	...	...	...	...
metazoan parasites. { Other diseases	10	...	...	5.4	...	0.25

Other diseases classified under systems.

Diseases of the nervous system	1	...	0.34	5.4	0.54	...	0.18
Mental diseases	...	2	0.28	2.2	...	1.09	0.15
Diseases of the eye	...	...	0.04	1.1	...	...	0.02
Diseases of the ear and nose	...	...	0.64	13.6	...	...	0.35
Diseases of the circulatory system.	...	...	...	...	...	...	...
{ Valvular disease of the heart	...	...	...	...	...	...	...
{ Disordered action of the heart	...	...	...	...	...	...	...
{ Other diseases	...	1	0.23	3.7	...	0.54	0.12
Diseases of the blood and blood forming organs	...	...	...	...	...	...	0.17
Diseases of ductless or endocrine glands	...	...	...	...	...	...	...
Diseases of the breast	...	...	...	3.7	...	...	...
Diseases of the respiratory system.	...	...	...	...	...	...	...
{ Larynx and trachea	...	...	0.09	2.2	...	...	0.05
{ Bronchi & bronchioles	...	...	0.23	6.0	...	...	0.12
{ Other diseases	...	...	0.34	2.2	...	...	0.18
Diseases of the teeth and gums	...	...	0.07	...	...	...	0.04
{ Inflammation of tonsils	...	...	...	...	...	...	...
{ Inflammation of pharynx.	...	...	0.45	18.6	...	...	0.24
{ Inflammation of stomach	...	...	0.12	5.4	...	...	0.07
{ Gastric ulcer	...	...	0.48	9.8	...	...	0.26
{ Duodenal ulcer	...	...	...	...	...	...	...
{ Liver	...	...	0.46	4.9	...	...	0.25
{ Other diseases	...	1	3.29	51.6	1.09	0.54	1.79
Diseases due to disorders of nutrition or of metabolism	...	...	...	...	...	...	...
Diseases of the generative system	...	...	0.01	0.5	...	...	0.01
Diseases of bones, joints, muscles, fasciae and bursae	...	...	0.53	9.8	...	...	0.29
Diseases of the areolar tissue	...	...	1.63	32.0	...	...	0.89
Diseases of the skin	...	...	0.20	3.3	...	...	0.11
Diseases of the urinary system	...	2	0.83	7.1	...	1.09	0.18
{ General	...	1	0.31	3.3	1.09	0.54	0.17
{ Local	...	6	2.55	41.8	1.09	13.26	1.39
{ In action	...	...	...	...	...	...	...
Injuries	...	...	...	...	...	...	...
Tumours and cysts	...	...	0.07	1.1	...	...	0.04
Poisons	...	...	0.06	1.1	...	...	0.03
Unappreciable disease	...	...	0.04	...	...	...	0.02
Sulides	...	...	...	...	...	...	...
Total	8	17	21.19	359.0	4.35	9.23	11.51

TABLE XXIII.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

Table showing admission and death ratios per 1,000 of strength by Commands contrasted with the previous year, and the average for the previous five years.

Commands.	Years.	Enteric group of fevers.		Influenza.		Cholera.		Smallpox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	{ 1932-36	1.6	0.13	9.5	0.01	0.0	0.0	0.2	0.02	131.3	0.09	12.5	0.02
	{ 1936 .	0.5	0.02	6.9	0.02	0.0	0.0	0.1	...	139.6	0.05	9.7	0.05
	{ 1937 .	1.0	0.09	5.0	...	0.0	...	0.2	...	103.5	0.02	11.2	0.02
Western Command	{ 1932-36	2.0	0.12	7.5	0.02	0.0	...	0.2	...	194.1	0.08	20.0	0.05
	{ 1936 .	0.6	0.08	6.6	...	...	...	0.2	...	128.4	0.08	7.3	0.05
	{ 1937 .	0.7	0.09	1.4	...	...	...	...	...	161.9	0.09	10.5	0.17
Eastern Command	{ 1932-36	1.7	0.08	7.2	0.01	0.0	0.03	0.3	0.01	118.8	0.06	12.6	0.04
	{ 1936 .	0.9	0.08	4.0	...	0.0	0.04	0.4	...	116.8	0.13	11.8	0.04
	{ 1937 .	0.9	0.17	4.5	...	0.0	...	0.2	...	82.3	0.08	11.6	...
Southern Command	{ 1932-36	1.5	0.16	8.4	...	...	...	0.2	0.04	84.8	0.01	14.9	0.02
	{ 1936 .	1.0	0.14	10.9	...	...	...	0.0	...	78.9	...	14.9	...
	{ 1937 .	0.7	...	11.5	...	...	...	0.2	...	66.6	...	17.2	0.05
All-India	{ 1932-36	1.6	0.12	8.9	0.01	0.0	0.01	0.2	0.01	152.6	0.07	15.5	0.08
	{ 1936 .	0.7	0.04	7.3	0.01	0.0	0.01	0.2	...	123.1	0.07	11.0	0.03
	{ 1937 .	0.9	0.09	5.7	...	0.0	...	0.2	...	97.9	0.04	12.4	0.01

Years.	Pyrexia of uncertain origin.		Pneumonia, lobar and lobular.		Venereal diseases.		Dysent.		Sandfly fever.		Plag. no.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command												
{ 1932-36	0.1	0.01	7.2	0.79	7.5	0.01	0.0	...	18.3	...	...	...
{ 1936	0.1	0.02	6.3	0.78	3.5	...	0.0	...	18.5	...	...	0.00
{ 1937	0.1	...	6.0	0.34	5.8	0.02	...	...	9.8	...	...	...
Western Command												
{ 1932-36	0.1	...	5.3	0.74	5.1	...	0.1	...	5.8	...	...	...
{ 1936	...	...	5.1	0.40	4.2	...	0.1	...	5.1	...	...	...
{ 1937	...	...	3.0	0.09	4.9	...	...	...	0.4	...	...	...
Eastern Command												
{ 1932-36	0.1	...	5.8	0.47	14.1	...	1.1	...	3.1	...	...	...
{ 1936	...	...	5.7	0.07	13.8	...	6.0	...	3.0	...	...	...
{ 1937	...	...	6.7	0.55	11.5	...	10.0	...	1.9	...	...	...
Southern Command												
{ 1932-36	0.2	0.02	3.8	0.30	11.0	0.01	5.6	...	2.8	...	0.1	0.00
{ 1936	0.2	...	2.9	0.24	10.0	...	0.1	...	2.1	...	...	...
{ 1937	0.3	...	3.0	0.25	11.4	...	5.5	...	0.5	...	...	...
All India												
{ 1932-36	0.1	0.01	11.1	0.64	10.3	0.01	2.3	...	10.5	...	0.0	0.02
{ 1936	0.1	0.01	5.4	0.62	9.8	...	2.5	...	10.6	...	...	...
{ 1937	0.1	...	5.2	0.34	8.1	0.01	5.1	...	9.0	...	...	...

TABLE XXIV.
DETAIL OF DISEASES.
1937.

Diseases.	European Army of India.						Indian Army.			
	British officers attached to European troops.			Men.			British officers attached to Indian troops.		Men present.	
	A.	D.	Inva- lida.	A.	Constant- ly sick.	D.	A.	D.	A.	D.
	2,055			47,388.			1,841		98,901	
<i>Diseases caused by infection or infestation.</i>										
Anthrax	..	..	..	..	..	..	..	..	1	..
Blackwater fever	..	..	..	..	..	..	..	..	2	..
Chickenpox	..	2	..	10	0.66	..	..	..	82	..
Common cold	..	25	..	643	11.89	..	..	..	1,139	..
Cholera	..	..	..	1	0.08	..	..	..	2	..
Cowpox	..	..	..	..	..	..	..	..	..	..
Dengue	..	13	..	576	12.04	..	..	..	501	..
Diphtheria	..	5	..	40	5.05	..	..	..	2	..
Dysentery—										
(a) Protozoal	9	..	..	126	11.02	..	..	..	75	..
(b) Bacillary	89	..	..	696	27.34	..	..	..	631	..
(c) Bacillary exudate.	8	..	..	237	9.92	..	..	..	247	..
(d) Clinical	8	..	..	250	10.08	..	..	..	233	..
Enteric fevers—										
(a) Typhoid	..	..	..	..	..	..	..	..	1	..
(b) Paratyphoid A.	..	..	..	6	0.80	3	..	..	36	7
(c) Paratyphoid B.	8	1	..	2	0.46	..	..	..	23	1
(d) Paratyphoid C.	..	..	..	2	0.23	..	..	..	..	..
(e) Enteric Group	1	..	..	26	8.44	1	..	..	29	1
Enteritis infective, (including food poisoning)	13	..	..	23	0.41	..	..	..	..	..
Erysipelas	2	..	..	7	0.25	..	..	..	4	..
Gangrene, acute infective	..	..	..	..	..	..	..	..	2	..
Hydrophobia (Rabies)	33	..	..	4	0.02	4	..	..	1	1
Influenza	..	..	..	776	18.40	..	..	..	565	..
Jaundice epidemic catarrhal	46	..	..	294	16.35	..	..	..	148	..

Jaundice spirochaeta.										
Leishmaniasis—										
(a) Kala-azar	3	0.62	1	..	..	..	..	..	16	2.79
(b) Oriental sore	12	1.50	..	..	..	1	..	..	135	8.21
Leucocy	2	0.23	..	..	..	..	..	..	7	0.04
Malaria	2,111	80.30	2	..	77	..	96	1	9,987	259.17
Measles	13	0.87	..	..	1	..	83	1	175	8.91
Meningococcal infection (cerebro-spinal fever)	..	..	..	..	..	..	..	..	..	..
Mumps	20	1.20	..	..	..	..	4	..	17	1.25
Plague	..	..	..	..	..	..	..	..	736	39.88
Pyæmia	..	..	..	..	..	..	..	..	..	..
Pyrexia of uncertain origin	5	0.54	..	..	..	..	1	..	1	0.21
Relapsing fever	..	..	..	..	..	..	..	..	8	0.60
Rheumatic fever	68	9.42	..	..	..	..	..	..	2	0.16
Rubeola (German measles)	26	0.66	..	..	2	..	6	..	75	0.55
Sandfly fever	1,167	23.08	..	..	9	..	15	..	594	13.25
Scarlet fever	1	0.10	..	..	2	..	14	..	6	0.52
Septicæmia	7	0.44	4	1	1	..	2	..	16	1.44
Smallpox	7	0.56	1	..	2	1	2	..	..	..
Tetanus	1	0.13	..	..	..	..	1	..	2	0.04
Tuberculosis pulmonary	61	12.24	1	62	6	1	1	..	150	12.14
Tuberculosis other cases	7	0.55	..	6	..	..	2	..	35	19
Typhus fever	29	3.60	1	..	..	..	1	..	48	3.86
Unident. fever	1	0.43	..	..	..	..	..	..	1	0.60
Venerial diseases—	..	..	..	..	..	..	..	..	..	..
(a) Gonorrhœa	1,845	178.55	..	4	..	1	..	..	338	35.64
(b) Soft chancre	269	26.18	..	..	..	..	..	..	172	17.02
(c) Syphilis	273	23.72	..	1	..	..	..	..	300	30.05
(d) Other cases	27	3.10	..	..	..	..	..	..	2	0.48
Whooping-cough	..	..	..	..	..	..	14	..	..	..
Other diseases caused by infection due to infestation by <i>measozoa parasites</i> .	10	1.53	1	1	..	..	5	..	8	1.02
Ankylostomiasis	6	0.45	..	..	..	..	1	..	415	24.10
Ascariasis	5	0.11	..	..	..	..	..	..	101	3.13
Bilharziasis	..	..	..	..	..	..	..	..	..	..
Dracontiasis (Guinea-worm)	12	0.35	..	..	..	..	9	..	209	14.29
Intestinal teniasis—	..	..	..	..	..	..	..	..	..	..
(a) <i>Tænia Solium</i>	20	0.51	..	..	14	..	4	..	10	0.28
(b) <i>Tænia Saginata</i>	132	2.38	..	..	..	..	24	..	18	0.71
Other intestinal parasites	4	0.17	..	2	1	..	..	..	13	0.42
Pediculosis	6	0.08	..	..	..	..	..	..	1	0.03
Scabies	64	2.11	..	..	..	..	..	..	761	24.36
Other diseases due to infestation	7	0.19	..	..	3	..	8	..	9	0.46

A.—Admissions, D.—Deaths.

TABLE XXIV—contd.

[illegible]

Iritis	4	0.20	...	...	...	...	...	3	...	...	18	...	...	2.17
Keratitis	17	1.19	...	...	...	...	...	...	...	...	176	...	...	10.40
Retinitis	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other diseases of the eye .	35	1.70	...	...	...	...	...	3	...	...	105	...	...	8.50

Diseases of the ear.

Inflammation of the external ear	3	...	...	...	...	...	...	5	...	...	73	...	...	2.70
Diseases of the middle ear	1	...	...	...	...	...	...	25	...	...	262	...	...	11.08
Furunculosis	9	164	6.87	...	...	...	...	3	...	...	70	...	...	1.71
Diseases of the mastoid process	...	191	4.67	...	...	...	...	...	...	...	...	...	...	...
Other diseases of the ear .	...	18	2.04	...	...	...	...	8	...	...	8	...	...	0.32
	...	6	0.26	...	...	...	...	...	...	...	23	...	...	1.04

Diseases of the nose.

Diseases of the mucous membrane	9	313	6.25	...	...	...	...	40	...	...	454	...	...	8.43
Diseases of the bone and cartilage	...	2	0.17	...	...	...	...	...	...	...	...	...	...	...
Sinusitis	11	114	8.04	...	...	...	...	2	...	...	33	...	...	1.27
Other diseases of the nose .	4	139	4.77	...	...	...	...	...	...	...	9	...	...	0.40

Diseases of the circulatory system.

Diseases of the valves	...	17	3.79	...	...	...	...	...	...	...	16	2	6	1.02
Disordered action of the heart	...	79	8.63	...	...	...	...	2	...	...	36	4	7	2.35
Diseases of blood vessels .	3	63	9.57	...	...	...	...	2	...	...	23	2	4	1.89
Endocarditis	...	10	1.73	...	...	...	...	6	...	...	1	...	1	0.08
Myocarditis	...	3	0.67	...	...	...	...	...	...	...	1	...	...	0.13
Pericarditis	...	...	...	...	...	...	...	...	...	...	2	1	1	0.10
Other diseases of the circulatory system	...	3	0.21	...	...	...	...	1	...	...	6	1	2	0.36

Diseases of the blood and blood forming organs.

Anæmia primary	...	6	0.20	...	...	...	...	3	...	...	5	...	...	0.46
Anæmia pernicious	...	19	1.00	...	...	...	...	...	...	...	6	...	...	1.27
Anæmia secondary	...	...	...	...	...	...	...	1	...	...	136	...	1	3.62
Diseases of the spleen . .	1	5	0.32	...	...	...	...	...	...	...	57	...	...	2.48
Lymphadenitis	4	203	13.54	...	...	...	...	22	...	...	182	...	...	8.69
Lymphangitis	...	9	0.31	...	...	...	...	...	...	...	5	...	...	0.25
Other blood diseases . . .	...	6	0.32	...	...	...	...	...	...	...	9	...	...	1.13

A.—Admissions. D.—Deaths.

Diseases of the digestive system.

Appendicitis	18	...	331	23.74	3	35	...	17	...	26	2	...	138	2	3	7.85
Cholecystitis and cholangitis	9	...	22	1.66	...	13	...	6	...	3	...	...	162	...	...	0.65
Gall	7	...	186	3.67	...	...	...	...	...	...	...	...	44	...	...	2.97
Colic	...	...	14	1.23	2	...	...	...	...	...	...	...	286	...	...	1.18
Constipation	8	1	276	5.40	...	23	...	53	...	6	...	...	535	...	...	4.57
Diarrhea	42	...	762	17.99	...	49	...	183	4	19	...	...	3	1	...	12.10
Enteritis	3	...	75	2.51	...	3	...	65	24	2	...	...	37	...	...	0.41
Fistula in ano.	3	...	6	0.60	...	...	...	...	...	18	...	...	100	...	...	2.38
Gastritis	14	...	255	10.81	...	24	...	19	...	...	...	...	11	...	...	3.43
Glossitis	...	...	4	0.22	...	...	...	...	...	...	...	...	166	...	...	0.38
Hæmorrhoids (piles)	11	...	193	8.13	...	6	...	...	...	8	...	...	48	...	...	7.04
Hepatitis acute	4	...	29	2.49	2	2	...	...	...	...	...	...	...	...	...	3.39
Hepatic abscess (Tropical abscess)	...	...	3	0.38	1	...	...	...	...	...	...	...	3	...	...	0.84
Hepatitis chronic (cirrhosis)	...	...	1	0.24	...	...	...	...	...	...	...	...	...	...	...	6.11
Hernia	3	1	110	9.56	4	4	...	16	...	2	...	...	80	...	8	0.86
Hypertrophy of the tonsils	6	...	183	5.68	...	9	...	148	...	3	...	...	10	...	...	10.33
Indigestion	6	...	125	3.55	...	12	...	18	...	...	...	...	401	...	1	0.49
Intestinal obstruction	...	...	4	0.31	2	1	...	...	...	...	...	...	3	...	...	0.01
Inflammation of the palate and pillars of the fauces	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.13
Jaundice	8	...	24	1.48	...	1	...	...	...	7	...	...	4	...	...	33.49
Pharyngitis	13	...	331	7.87	...	6	...	18	...	10	...	...	1,589	...	...	0.52
Peritonitis	...	...	16	1.74	...	1	...	1	...	...	...	...	3	...	...	0.61
Quinsy	...	...	100	2.88	...	10	...	...	...	...	...	...	24	...	...	1.23
Sprue	...	...	15	3.97	...	6	...	...	...	5	...	...	10	...	1	0.85
Stomatitis	...	...	6	0.20	...	1	...	35	...	...	...	...	25	...	...	13.50
Tonsillitis	...	...	1,362	32.71	...	52	...	205	1	25	...	...	570	...	...	8.08
Other diseases	43	...	235	16.83	1	36	...	20	1	10	...	...	134	...	5	...

Diseases due to disorders of nutrition or of metabolism.

Beriberi	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diabetes mellitus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gout	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Insanition	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eclampsia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Scurvy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other diseases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Diseases of the male organs of generation.

Balanitis	...	...	92	3.14	...	...	...	...	...	...	...	...	13	...	...	0.55
Epididymitis	...	...	46	2.30	...	...	...	...	...	...	...	...	13	...	...	0.60
Hydrocele of tunica vaginalis	...	...	28	1.95	...	...	...	...	...	...	...	...	6	...	...	0.04

A.—Amputation. D.—Deaths.

Diseases affecting child—

[illegible]

Diseases of the areolar tissue.

Boll	.	.	.	3	...	346	10.76	...	1	1	...	11	...	0	...	581	...	15.14
Carbuncle	.	.	.	2	...	19	0.66	...	...	2	...	...	...	4	...	29	...	1.20
Cebellitis	.	.	.	45	...	1,325	61.78	...	...	27	...	63	...	41	...	1,978	...	67.75
Cebellitis suppurative	.	.	.	1	...	132	5.42	...	...	0	...	0	...	5	...	344	...	18.37
(abscess).																		
Other diseases	.	.	.	2	...	20	0.86	...	...	2	...	3	1	...	...	12	...	0.65

Diseases of the skin.

[illegible]

A.—Admissions. D.—Deaths.

TABLE XXIV—*concd.*

Disease.	European Army of India.										Indian Army.			
	British Officers attached to European troops. 2,086				Men. 47,388		Women. 4,148		Children. 6,157		British Officers attached to Indian troops. 1,841		Men present. 98,901	
	A.	D.	In- valids.	Con- stantly sick.	A.	D.	A.	D.	A.	D.	A.	D.	In- valids.	Con- stantly sick.
<i>Diseases of the urinary organs.</i>														
Calculi—														
(a) Bladder	...	...	...	...	13	122	1	3	...	...	...	...	...	0.78
(b) Kidney	...	...	...	...	4	27	...	1	...	...	...	...	...	0.47
(c) Ureter	...	...	...	...	...	...	...	...	...	...	...	...	...	0.84
Cystitis	3	...	...	...	62	373	1	...	11	4	...	...	...	1.44
Hæmaturia	3	...	...	...	31	192	...	...	2	1	...	...	...	0.07
Incontinence of urine	...	...	...	...	6	0.12	...	...	2	...	...	...	...	...
Nephritis acute	...	...	...	...	12	170	3	2	2	5	...	...	...	2.17
Nephritis chronic	...	...	...	...	...	...	...	...	...	...	...	...	...	2.63
Renal colic	...	...	...	...	29	102	...	...	2	...	...	...	...	5.16
Other diseases	5	...	...	...	141	1063	2	4	14	25	...	...	...	...
<i>General injuries.</i>														
Burns and scalds	...	...	...	...	...	0.02	...	...	...	...	...	...	...	...
Effects of anti-rabic treatment.	...	...	...	...	1	...	...	...	...	...	...	...	...	...
Effects of inoculation	...	...	...	...	17	0.23	...	...	...	...	...	...	...	0.08
Heat-exhaustion	1	...	...	...	37	1.37	2	...	...	3	...	...	...	0.65
Heat-stroke	...	...	...	...	15	0.60	6	...	...	1	...	...	...	0.05
Sun-stroke	2	...	...	...	8	0.20	...	...	...	2	...	...	...	...
Other injuries	3	...	...	...	25	0.76	15	1	1	1	...	...	...	0.50
<i>Local injuries.</i>														
Abrasions	5	...	...	...	114	3.23	...	...	...	4	...	...	...	6.28
Burns and scalds	...	...	...	...	82	2.64	...	...	...	5	...	...	...	6.95
Concussions	15	1	...	...	168	9.57	1	2	1	4	...	...	...	1.20

Operations	21	1	562	15.83	1	1	8	12	...	...	1,556	...	6	49.52
Dislocation and displace-	2	...	72	3.40	...	2	1	4	...	...	70	...	3	4.40
Fractures	33	1	643	50.52	4	34	38	32	1	5	1,032	12	54	89.70
Sprains and strains	10	...	749	21.08	...	...	5	8	...	...	610	...	3	19.88
Wounds gun-shot	2	1	18	1.08	1	10	...	3	1	...	94	19	9	7.93
Wounds others	7	...	210	7.86	3	5	15	12	...	...	1,214	...	1	44.39
Injuries self-inflicted	...	...	4	0.05	5	...	...	...	...	...	4	6	...	0.04
Other injuries	4	1	106	6.03	3	7	3	1	...	...	138	3	1	8.50
<i>Tumours and cysts.</i>														
Carcinoma	1	...	2	0.13	...	1	...	...	...	...	2	1	1	0.05
Cysts	...	...	63	1.88	...	9	...	1	...	...	69	...	...	2.43
Sarcoma	...	...	...	...	...	...	...	...	...	...	3	...	4	0.78
New growths malignant	1	...	28	2.05	1	2	1	...	...	...	6	...	1	0.31
(other cases)	...	...	...	...	...	...	...	...	...	...	...	...	...	...
New growths non-malignant	3	1	25	1.68	...	2	...	1	...	...	53	...	4	4.02
Malformations	...	...	3	0.23	...	1	...	...	...	...	8	...	4	0.55
<i>Poisons.</i>														
Alcohol	...	...	1	0.05	...	...	...	1	...	...	1	...	...	0.06
Arsenic	...	...	3	0.06	...	...	...	...	...	...	2	...	...	0.07
Chloroform	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other chemical poisons	...	...	1	0.03	...	...	1	...	...	...	2	1	...	0.04
Optum of insects	...	...	1	0.01	1	...	...	...	...	...	1	1	...	0.00
Venom of snake	1	...	...	...	...	...	...	...	...	...	3	...	...	0.03
Venom of Ophidia (snake bite)	...	...	...	...	...	...	...	...	...	...	7	...	...	0.27
Other poisons	...	...	1	0.02	...	...	...	1	...	...	...	...	...	...
No appreciable disease	2	...	151	5.75	...	30	...	...	...	...	87	...	...	3.08
All other causes	...	...	1	0.10	...	5	...	...	...	...	16	...	...	1.03
Total	865	7	26,908	1,280.21	102	520	1,326	17	2,206	79	38,735	175	543	1,498.18
A.—Admissions. D.—Deaths.														



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